Generic Data for Representing Truck Tire Characteristics in Simulations of Braking and Braking-in-a-Turn Maneuvers

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16. Abstract

The generic data presented in this report are intended for use in studying the performance of trucks (including articulated vehicles) in braking and braking-in-a-turn manuevers, such as those included in recent versions of Federal Motor Vehicle Safety Standard (FMVSS) 121. These data are based on a semiempirical tire model that uses simplified theoretical concepts in conjunction with measured or specified tire stiffness and tire-road frictionnal qualities. These data are not measured directly; rather they are computed using measured and specified tire properties.

The main body of this report provides a users manual for spread sheet calculations that compute longitudinal and lateral tire forces as functions of vertical load, velocity, longitudinal slip, and slip angle. The results of these calculations are tables of data containing values of tire forces that are suitable for use in computer simulations of heavy trucks.

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GENERIC DATA FOR REPRESENTING TRUCK TIRE CHARACTERISTICS IN SIMULATIONS OF BRAKING AND BRAKING-IN-A-TURN MANEUVERS

Introduction

The generic data presented in this report are intended for use in studying the performance of trucks (including articulated vehicles) in braking and braking-in-a-turn maneuvers, such as those included in recent versions of FMVSS 121 [1]. These data are based on a semiempirical tire model that uses simplified theoretical concepts in conjunction with measured or specified tire stiffnesses and tire-road frictional qualities. (See Appendix A for a discussion of the physical reasoning and equations used in the semi-empirical tire model.)

The main body of this report provides a users manual for spread sheet calculations that compute longitudinal and lateral tire forces as functions of vertical load, velocity, longitudinal slip, and slip angle. The results of these calculations are tables of data containing values of tire forces that are suitable for use in computer simulations of heavy trucks (e.g. Phase 4 [2]).

Structure of the Spread Sheet

The particular spread sheet application used in this study is EXCEL [3]. Figure 1 shows a typical example of a calculation representing a truck tire that has a rib tread pattern and radial construction (tire designation 295 75R.XL4).

In order for the equations implemented in the spread sheet to compute tire forces, one needs to enter values for longitudinal slip, slip angle, speed, and vertical load. In addition, one needs parametric values for longitudinal stiffness Cs, lateral stiffness Calpha, and friction parameters muo, muf, and Vf. The spread sheet program will compute a number of intermediate variables pertaining to the tire model as well as the longitudinal force Fx, which is in the direction of the wheel plane, and the lateral force Fy, which acts perpendicularly to the wheel plane. (Appendix B contains a list summarizing the equations used in the spread sheet calculations. The equations in Appendix B are labelled with letters to indicate the applicable columns of the spread sheet shown in Figure 1.)

Although the equations in the tire model may seem difficult to understand, they are typical of those used in semiempirical tire models [4]. This model differs from previous models in the manner in which friction is treated.

	A	B	C	D	E	F	G	H
1	s	tan alpha	u	Fz	Cs	Calpha	Vs	mu
2	0.00001	0.069926787	66	6000	48000	43200	4.61516798	0.8467696
3	0.05	0.069926787	66	6000	48000	43200	5.673603356	0.835383621
4	0.1	0.069926787	66	6000	48000	43200	8.053556671	0.810830157
5	0.2	0.069926787	66	6000	48000	43200	13.98355373	0.75550731
6	0.25	0.069926787	66	6000	48000	43200	17.13329434	0.729218897
7	0.3	0.069926787	66	6000	48000	43200	20.33075933	0.704519742
8	0.35	0.069926787	66	6000	48000	43200	23.55652298	0.681479257
9	0.4	0.069926787	66	6000	48000	43200	26.80036893	0.660067331
10	0.5	0.069926787	66	6000	48000	43200	33.32116107	0.62182679
11	0.6	0.069926787	66	6000	48000	43200	39.86802949	0.589088874
12	0.75	0.069926787	66	6000	48000	43200	49.7146837	0.548718438
13	0.99999	0.069926787	66	6000	48000	43200	66.16050677	0.499577596
14								
15	alpha (deg)=	4	muo=	0.9	muf=	0.4	Vf=	41

	I	J	K	L	M	N	O	P
1	sin theta	cos theta	xsy/L'	xsy/L	Fy	xsx/L'	xsx/L	Fx
2	0.99999999	0.000143007	0.840920318	0.840920318	2944.420287	0.756828286	0.756828286	0.451620925
3	0.813445643	0.581640942	0.641109236	0.641109236	2770.258492	0.576998313	0.576998313	2074.281025
4	0.573059596	0.819513697	0.415304012	0.415304012	2209.006	0.373773611	0.373773611	3241.816053
5	0.330042564	0.943966051	0.198103681	0.198103681	1347.906217	0.178293313	0.178293313	3897.577448
6	0.269368391	0.963037211	0.146305194	0.146305194	1092.355588	0.131674675	0.131674675	3936.178078
7	0.227004209	0.973893777	0.11117805	0.11117805	906.2319139	0.100060245	0.100060245	3910.802132
8	0.195918894	0.980620103	0.086185906	0.086185906	766.5667278	0.077567316	0.077567316	3854.1253
9	0.172205388	0.985061066	0.067729857	0.067729857	658.9069258	0.060956871	0.060956871	3782.336088
10	0.138505616	0.990361648	0.042766209	0.042766209	505.709103	0.038489588	0.038489588	3623.890907
11	0.115761125	0.993277082	0.027089281	0.027089281	403.6195973	0.024380353	0.024380353	3467.973948
12	0.092833095	0.995681684	0.012646965	0.012646965	303.7027036	0.011382269	0.011382269	3259.437319
13	0.069757143	0.997564003	3.46087E-07	3.46087E-07	209.0945988	3.11479E-07	3.11479E-07	2990.163296
14								
15								

Figure 1. Example Spreadsheet

Discussion of the Input Parameters

To use the spread sheet effectively one should know what the input parameters mean. Briefly, Cs is the longitudinal stiffness of the tire. It is an elastic property of the tire that changes with vertical load Fz. (The following equation has been used to estimate Cs as a function of vertical load: $Cs = 10\,Fz - Fz^2/3000$ lbs.) The cornering stiffness Calpha is also an elastic property of the tire that changes with vertical load. (Calpha has been estimated using Calpha = 0.9 Cs.) With regard to test data Calpha is the slope of the longitudinal force curve in the vicinity of zero slip angle, while Cs is the slope of the longitudinal force curve in the vicinity of zero longitudinal slip. Both Cs and Calpha are functions of tread wear and inflation pressure. If suitable test data exist over a range of pertinent vertical loads, Cs and Calpha can be estimated from the slopes of the curves for longitudinal force versus longitudinal slip and lateral force versus slip angle.

The frictional characteristics of the tire depend on properties of both the tire and the road surface. The friction "mu" also depends upon vertical load and sliding velocity. The quantities used in the spread sheet to represent frictional characteristics (that is, muo, muf, and Vf) might be estimated or determined for each vertical load. However, for providing generic data we have considered mu to be a function of sliding velocity per equation (H) in Appendix B.

A recommended procedure for determining friction related quantities at a given load is to choose a measured μ-slip curve (Fx/Fz versus longitudinal slip s) and to use this curve in estimating how friction varies with sliding velocity at that load. (Equations (H) and (H15) in Appendix B express the ideas involved.)

As a function of sliding velocity, friction decreases as sliding velocity increases. Hence the specifications involving peak or slide values of longitudinal tire force need to state speed and load at which the specifications are to be met.

Generic Truck Tire Properties for a Good Dry Road

Appendix C provides generic tire data for a "0.9 surface" at Fz = 3000, 6000, and 9000 lbs and forward speeds ("u" in the direction of the wheel plane) of 22, 44, 66, and 88 ft/sec. The example results given in Figure 2 provide longitudinal and lateral force characteristics at near rated load (6000 lbs), 66 ft/sec, and 4 degrees of slip angle for values of longitudinal slip varying from 0 to 1. The spread sheet can be used to make similar calculations at different loads, speeds, and slip angles. See Appendix C for numerous examples.

	A	B	C	D	E	F	G	H
1	s	tan alpha	u	Fz	Cs	Calpha	Vs	mu
2	0.00001	0.06992679	66	6000	48000	43200	4.61516798	0.8467696
3	0.05	0.06992679	66	6000	48000	43200	5.67360336	0.83538362
4	0.1	0.06992679	66	6000	48000	43200	8.05355667	0.81083016
5	0.15	0.06992679	66	6000	48000	43200	10.9229014	0.78306162
6	0.2	0.06992679	66	6000	48000	43200	13.9835537	0.75550731
7	0.25	0.06992679	66	6000	48000	43200	17.1332943	0.7292189
8	0.3	0.06992679	66	6000	48000	43200	20.3307593	0.70451974
9	0.4	0.06992679	66	6000	48000	43200	26.8003689	0.66006733
10	0.5	0.06992679	66	6000	48000	43200	33.3211611	0.62182679
11	0.6	0.06992679	66	6000	48000	43200	39.8680295	0.58908887
12	0.75	0.06992679	66	6000	48000	43200	49.7146837	0.54871844
13	0.99999	0.06992679	66	6000	48000	43200	66.1605068	0.4995776
14								
15	alpha (deg)=	4	muo=	0.9	muf=	0.4	Vf=	41
16								
17	s	Fy	Fx					
18	0	2944.42029	0					
19	0.05	2770.25849	2074.28103					
20	0.1	2209.006	3241.81605					
21	0.15	1707.94507	3723.18072					
22	0.2	1347.90622	3897.57745					
23	0.25	1092.35559	3936.17808					
24	0.3	906.231914	3910.80213					
25	0.4	658.906926	3782.33609					
26	0.5	505.709103	3623.89091					
27	0.6	403.619597	3467.97395					
28	0.75	303.702704	3259.43732					
29	1	209.094599	2990.1633					
30								

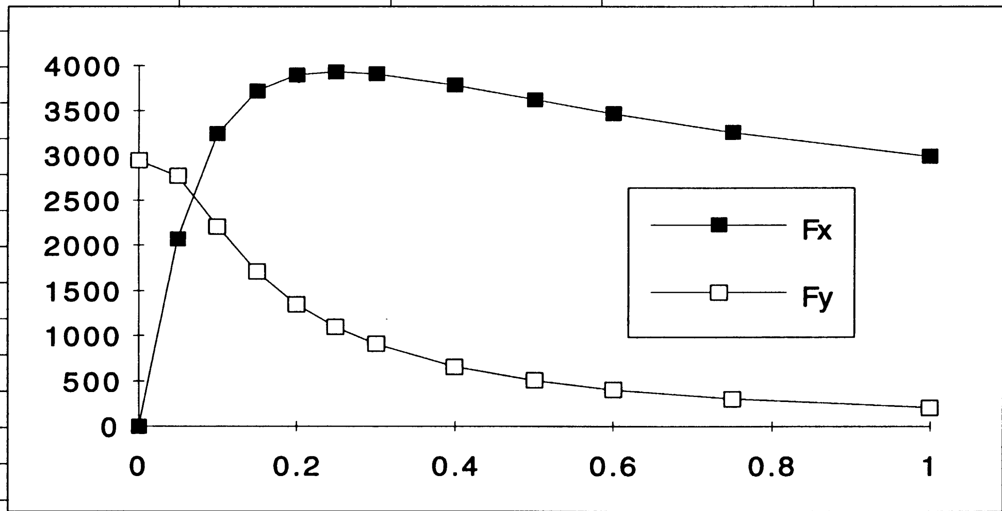

Figure 2 Example results for a 0.9 surface

Generic Truck Tire Properties for a Wet, Slippery Surface

The model provides results that are in qualitative agreement with those measured by Ervin many years ago [5]. Unfortunately, recent tire measurements do not include tests on wet surfaces (nor do they include tests at speeds other than 45 mph). Nevertheless, we can use the tire model to produce generic data for use in simulations of braking-in-a-turn maneuvers on a wet, slippery surface.

Since the surface conditions do not influence the elastic properties of the tire, the values of Cs and Calpha used previously can be used again. In order to represent a poor, wet road we have chosen muo = 0.5, muf = 0.3 and Vf = 37 ft/sec. Examination of Figure 3 shows that this combination of parameters gives a peak normalized force of 2363/6000 = 0.39 at 66 ft/sec (45 mph) and alpha = 0.

Appendix D contains a generic set of tire data for a "0.5 surface." The values of Fx and Fy in Appendix D can be used directly to make tables for use in the Phase 4 simulation program. Or, these results can be processed to generate "roll-off tables" for use along with tables of longitudinal force at alpha = 0 and lateral force at s = 0.

Concluding Statements

Basic data for representing a generically reasonable set of truck tire shear force characteristics have been developed in this study. These data need to be structured to put them into the user's version of the Phase 4 simulation program.

Another alternative is to replace the tire model currently existing in Phase 4 with the tire model described in Appendices A and B. This would take some programming effort, however.

It is recommended that the generic data used in the simulations cover the ranges of velocities and vertical loads pertinent to the vehicle situation to be studied. For example, in a braking-in-a-turn maneuver at 30 mph (44 ft/sec) on a 500 ft radius turn, the lateral acceleration required to follow the curve on a level surface is equal to $V^2/R = (44)^2/500 = 3.87$ ft/sec^2 or 0.12 g. For an 80,000 lb vehicle with 18 tires this would mean approximately 535 lbs of lateral force per tire. For a cornering stiffness of about 37,500 lbs at 4400 lbs of load, this would mean just under one degree of slip angle at each tire. Even if slip were to be around 0.3, the tires would not need more than about a 3 degree slip angle in order for the vehicle to negotiate the turn. Hence, for vehicles with ABS systems that keep longitudinal slip below 0.3, there would be limited use for lateral force data exceeding 4 degrees of slip angle. However, if wheel lock or vehicle spinning or swinging were to occur, large slip angles would be involved.

The data need to be concentrated at the smaller slip angles for the purpose of studying vehicle performance in 121 like maneuvers. Also, static vertical loads around 4500 lbs per tire seem appropriate for these simulations.

	A	B	C	D	E	F	G	H
1	s	tan alpha	u	Fz	Cs	Calpha	Vs	mu
2	0.00001	1.7453E-08	66	6000	48000	43200	0.00066	0.49999465
3	0.05	1.7453E-08	66	6000	48000	43200	3.3	0.47440175
4	0.1	1.7453E-08	66	6000	48000	43200	6.6	0.45098774
5	0.15	1.7453E-08	66	6000	48000	43200	9.9	0.42957159
6	0.2	1.7453E-08	66	6000	48000	43200	13.2	0.40998282
7	0.25	1.7453E-08	66	6000	48000	43200	16.5	0.39206551
8	0.3	1.7453E-08	66	6000	48000	43200	19.8	0.37567705
9	0.4	1.7453E-08	66	6000	48000	43200	26.4	0.34697595
10	0.5	1.7453E-08	66	6000	48000	43200	33	0.32296387
11	0.6	1.7453E-08	66	6000	48000	43200	39.6	0.30287475
12	0.75	1.7453E-08	66	6000	48000	43200	49.5	0.27872373
13	0.99999	1.7453E-08	66	6000	48000	43200	65.99934	0.25040128
14								
15	alpha (deg)=	0.000001	muo=	0.5	muf=	0.2	Vf=	37
16								
17	s	Fy	Fx					
18	0	0.00075399	0					
19	0.05	0.00068262	2044.64487					
20	0.1	0.00040571	2362.70592					
21	0.15	0.00027455	2381.36454					
22	0.2	0.00020244	2333.83249					
23	0.25	0.00015752	2265.92819					
24	0.3	0.00012714	2192.31648					
25	0.4	8.9196E-05	2047.99536					
26	0.5	6.6883E-05	1918.22592					
27	0.6	5.2491E-05	1805.78185					
28	0.75	3.8792E-05	1667.48695					
29	1	2.6222E-05	1502.40755					
30								

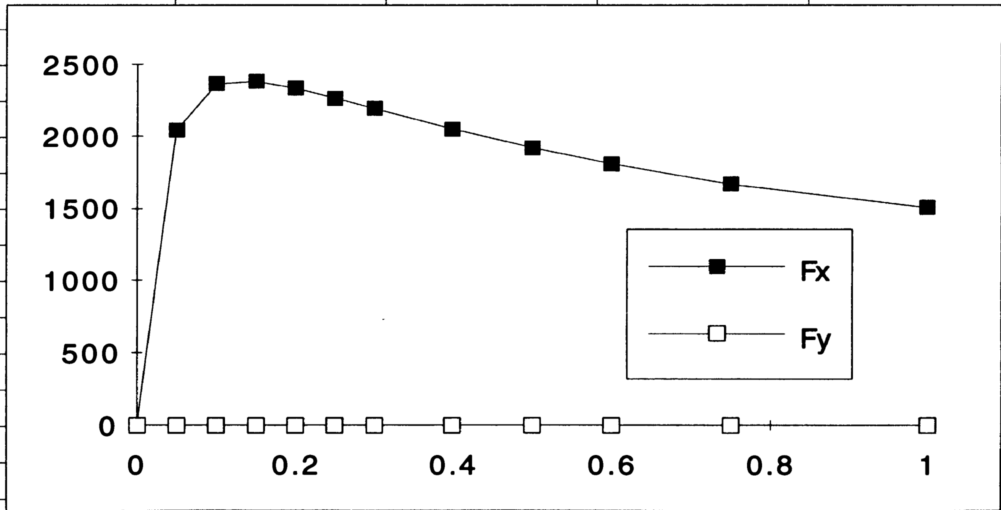

Figure 3. Example results for a 0.5 surface

Acknowledgement

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[5] U.S. Department of Transportation and Motor Vehicle Manufacturers Association of the United States, Inc., *Noise and Traction Characteristics of Bias-Ply and Radial Tires for Heavy Duty Trucks*. Joint DOT/MVMA Study. Final Report, October 1977.

APPENDIX A

MODELING THE TRUCK TIRE FOR VEHICLE DYNAMICS ANALYSIS

Introductory Remarks

This appendix examines the modeling of truck tires from the perspective of analyzing and simulating the braking and handling responses of commercial vehicles. The overall thesis underlying the following discussion is that a semiempirical model of the shear force properties of truck tires aids in understanding the interaction between tire properties and vehicle response variables.

The development of methods for representing the longitudinal and lateral force properties of pneumatic tires has received considerable attention in recent years [1,2]. A curve fitting approach associated with the so-called "magic formula" [3] has been the basis for many studies and papers on representing tire force and moment data in a manner suitable for use in analyses of the dynamics of pneumatic-tired vehicles. Nevertheless, there is still discussion concerning the advantages and disadvantages of different methods for representing tires in general, and truck tires are no exception. A particularly difficult situation has been the representation of tire force characteristics when the tire is simultaneously generating both longitudinal and lateral force, such as in a braking-in-a-turn maneuver. Since there are now new requirements in FMVSS 121 concerning the performance of heavy trucks in a braking-in-a-turn maneuver, there is renewed interest in understanding how tire characteristics influence vehicle dynamics.

Rather than emphasizing either curve fitting or pure empiricism, this lecture will emphasize a combined theoretical and empirical approach to modeling the truck tire. This approach involves considering the deformations that take place in the tire contact patch. The goal is to develop insight into the concepts of longitudinal and lateral slip. The discussion explores ideas concerning whether tread elements are adhering to the road surface or sliding over the road surface. Even though the tire is a very complex structure and the phenomena involved with sliding friction are difficult to understand, a simple set of equations for describing tire deformation and frictional characteristics is developed here.

Inputs to the Tire Representation

In addition to vertical load and the velocity of the wheel center, two primary inputs to a computerized representation of tire shear force properties are lateral and longitudinal slip, or as they are commonly referred to, slip angle and slip. In a computerized model of a vehicle, slip angle is calculated from the ratio of (a) the component of velocity normal to the wheel plane to (b) the component of velocity lying along the wheel plane. These velocity components are determined from the variables describing the motions of the entire vehicle plus the characteristics of any steering system associated with particular wheels. Hence, the solutions to the basic equations of motion of the vehicle provide the information needed to determine slip angle.

On the other hand, the determination of longitudinal slip requires knowledge of the rotational speed of the wheel. Hence, wheel rotational degrees of freedom are included in computerized models involving braking dynamics.

A Semiempirical Model of the Braking Properties of Truck Tires

For braking studies, the development of a method for representing the longitudinal force properties of tires is clearly essential. Prior to the availability of data from an over-the-road, truck-tire dynamometer, semiempirical models were developed and used. A semiempirical model consists of a phenomenological description of the deflection and shear force characteristics of a tire [4,5]. Empirical data (or estimated shear force characteristics of the tire) are needed to evaluate the parameters used in this type of model. The values of the parameters are selected so that the forces predicted by the model match test results or a desired set of tire properties.

In this type of model, a quasistatic analysis of the rotating tire is made. The tread is envisioned as a continuum of elastic elements that touch the ground in the contact patch. Even through the wheel is rotating, some tread element is assumed to be deflected by a determinable amount at each point in the contact patch. The following sketches (Figures 1 and 2) and the subsequent analysis are intended to clarify the form of the tire model.

As shown in Figure 1, tread elements are assumed to become elongated longitudinally as they pass through the contact patch. For an arbitrary element at a distance, x, from the front of the contact patch (see Figure 2), the deflection, δ, of that element may be determined from the longitudinal slip, using the following reasoning. For an element entering the contact patch Δt_x seconds ago, the carcass end of the element has traveled a distance equal to $R\ \omega\ \ \Delta t_x$. The road-contact end of this element has traveled a distance equal to $V\ \ \Delta t_x$ if this end of the element adheres to the road. (The case of sliding friction between tire elements and the road will be treated later.) Hence, the deflection of the element at point x in the carcass is given by:

$$\delta(x) = (V - R\omega)\Delta t_x$$

By noting that $x = R\,\omega\,\Delta t_x$., it is possible to express the deflection as a function of slip, viz.:

$$\frac{\delta(x)}{x} = \frac{(V - R\omega)\Delta t_x}{R\,\omega\,\Delta t_x} = \frac{V}{R\omega}\left(1 - \frac{R\omega}{V}\right)$$

or, since $s = \left(1 - \frac{R\omega}{V}\right)$,

$$\delta(x) = \frac{xs}{1-s} \tag{4}$$

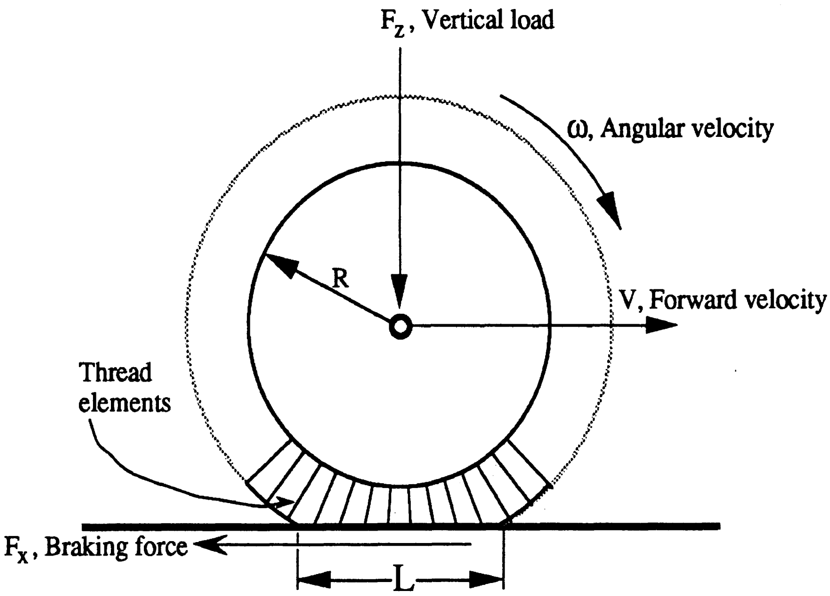


Figure 1. Sketch of an idealized tire.

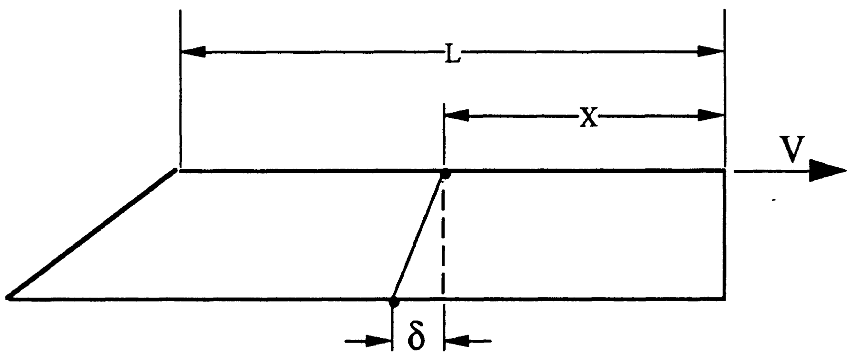


Figure 2. The longitudinal deflection, δ, of a tread element at location x in the contact patch.

Figure 3 illustrates the predicted form of the deflection pattern along the length of the contact patch for a situation in which no elements are sliding with respect to the road.

For simplicity, variations in deformation over the width, w, of the contact patch are assumed to be averaged out, and the deflection pattern in Figure 3 may be thought of as an average over the lateral direction.

To compute the total shear force due to the deflection pattern, the tire is assumed to be characterized by a stiffness per unit area of the contact patch. This stiffness parameter, k_x, will be replaced by an empirically determined longitudinal stiffness parameter, C_s, in the final form of the brake-force model. Nevertheless, k_x serves as a means for converting deflection into shear stress. Specifically, the following integral defines the braking force, F_x, when no sliding occurs:

$$F_x = \int_{x=0}^{L} \delta(x) k_x w dx$$

Substituting for $\delta(x)$ from (4) and on evaluating the above integral, we obtain

$$F_x = \left(\frac{k_x L^2 w}{2}\right)\left(\frac{s}{1-s}\right) = \frac{C_s s}{1-s} \tag{5}$$

The quantity $\frac{K_x L^2 w}{2}$ in Equation (5) is equal to $\left.\frac{\partial F_x}{\partial s}\right|_{s=0}$, and it is defined as the longitudinal stiffness parameter, C_s. Furthermore, C_s may be evaluated empirically from the slope of test data for F_x versus s without knowing k_x or the dimensions of the contact patch.

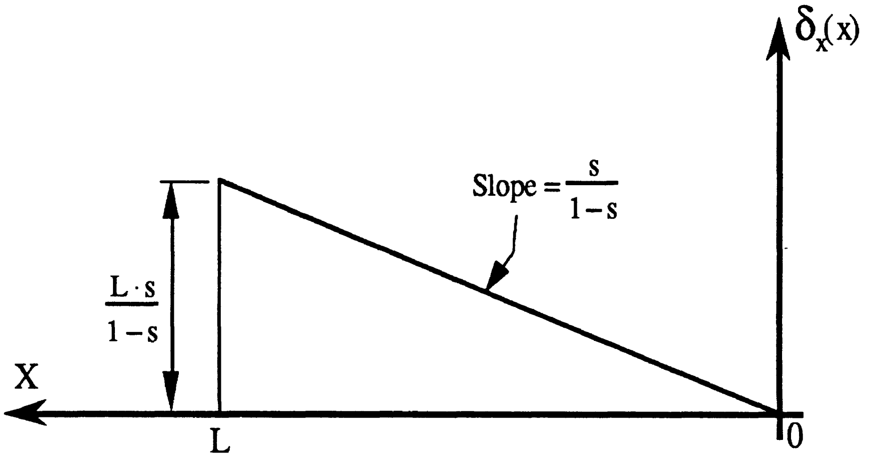


Figure 3. Tire deflection pattern, no sliding.

Sliding starts to occur in the contact patch at the point where the frictional potential per unit area cannot support any more deflection. That is, sliding starts when

$$\frac{\mu F_z}{A} = \frac{k_x x_s s}{1-s} \tag{6}$$

where

μ is the tire-road friction coefficient,
A is the area of the contact patch (A = Lw),
F_z is the vertical load (a uniform pressure distribution of magnitude F_z/A is assumed in developing the simplest model),
and x_s is the value of x at which sliding starts.

Figure 4 illustrates the estimated form of a deflection pattern with sliding at the rear of the contact patch.

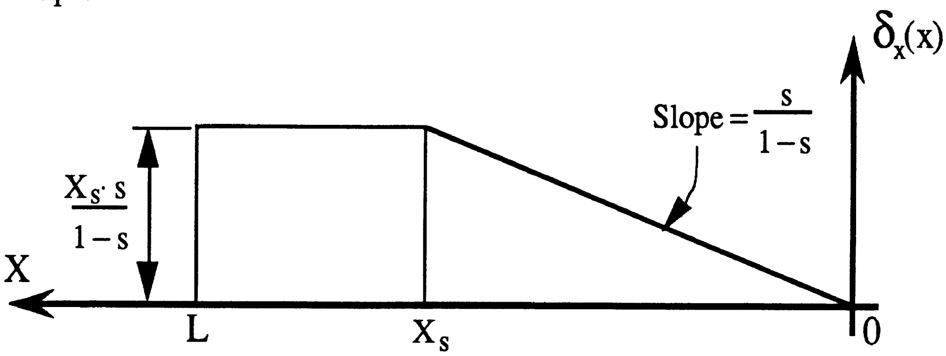


Figure 4. Tire deflection pattern, with sliding.

For the deflection pattern shown in Figure 4, the longitudinal shear force, F_x, is given by

$$F_x = \int_{x=0}^{x_s} \delta(x) k_x w dx + \frac{\mu F_z}{A} w(L - x_s)$$

or

$$F_x = \frac{k_x x_s^2 w}{2}\left(\frac{s}{1-s}\right) + \mu F_z\left(1 - \frac{x_s}{L}\right) \tag{7}$$

It is convenient to re-express (7) in terms of C_s, the longitudinal stiffness, and x_s/L, the fraction of the contact patch which is not sliding. Using Equation (6), we see that

$$\frac{x_s}{L} = \frac{\mu F_z}{k_x A L \frac{s}{1-s}} = \frac{\mu F_z(1-s)}{2C_s s} \tag{8}$$

and, using Equations (8) and (7), we find that

$$F_x = \frac{(\mu F_z)^2}{4C_s}\left(\frac{1-s}{s}\right) + \mu F_z\left(1 - \frac{x_s}{L}\right) \tag{9}$$

In numerical computations, x_s/L,is evaluated from Equation (8) if $s > 0$. If x_s/L is greater than 1.0, then no sliding takes place in the contact patch and F_x is evaluated using Equation (5). Note that for a locked wheel (i.e., s = 1.0), all of the contact patch is sliding (x_s/L = o), and F_x is determined exclusively by tire-road friction (i.e., $F_x = \mu F_z$).

If the friction coefficient, μ is treated as a constant, then the model will predict that the maximum braking force occurs at locked-wheel conditions. However, in practice, μ is not constant and the braking force reaches a maximum at some intermediate value of slip, usually around s = 0.2 to 0.3. Experiments with pieces of tire tread indicate that tire-road friction tends to decrease with sliding velocity. A simple method for including this phenomenon in the model is to make μ an exponential function of sliding velocity; viz.,

$$\mu = muf + (muo - muf) \exp(-V_s / Vf) \quad (10)$$

where

muf = the minimum friction for the surface, and

muo = the maximum friction for the surface, and

Vf determines the shape of the friction function ,

and V_s is the sliding velocity of the tread elements with respect to the ground (i.e., V_s = Vs) .

Insight into the frictional process and what is going on in the sliding region can be obtained by using the model to study tire deflection and sliding velocity. The assumption of a nearly uniform pressure distribution makes the discussion much easier to understand. Figure 5, which is similar to Figure 4, shows where the ends of the tread elements in the sliding region would have been if they had adhered to the ground. However, once an element enters the sliding region it is sliding by an amount that depends upon the distance from the adhesion point (where the sliding velocity would be zero) to the amount of deflection that can be supported by its local friction factor. In steady state, the sliding velocity of an arbitrary point in the sliding region is given by its virtual displacement divided by the length of time it takes the tire to rotate to that arbitrary point. See Figure 6. Translating these words into equations yields:

$$Vs(x') = [x' (s/(1-s))]/[x'/R\omega] = V - R\omega \quad (11)$$

where the time to rotate an amount x' is given by $\Delta t' = x'/R\omega$.

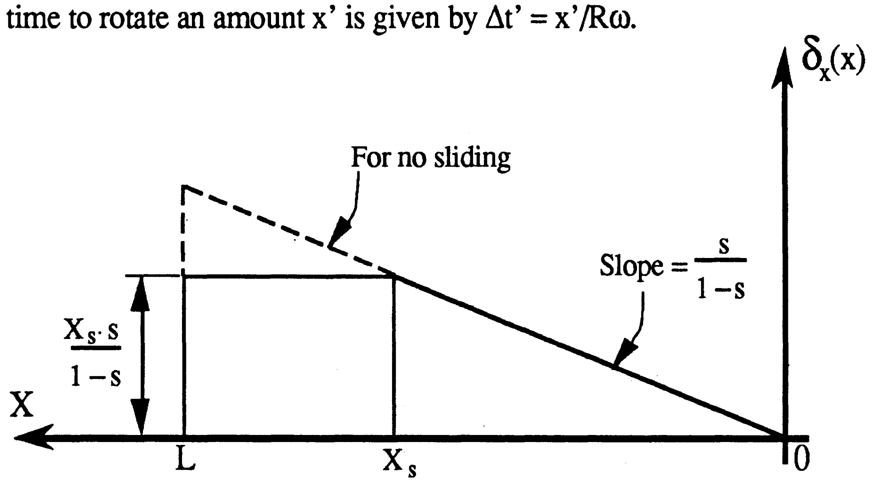


Figure 5. The difference between sliding and no sliding.

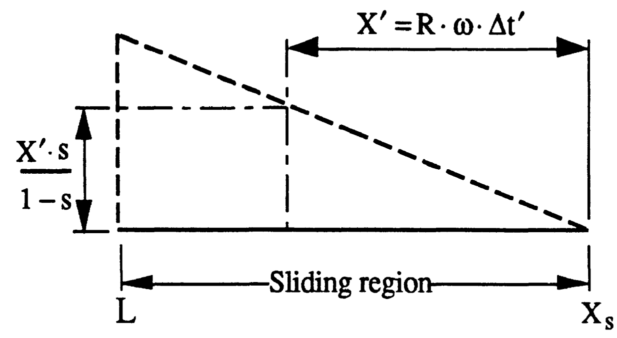


Figure 6. Examination of the sliding velocity in the sliding region.

Equation 11 is an extraordinary result even if it seems obvious once it is understood. The point is that each element in the contact patch is sliding at the same sliding velocity. Clearly, if the pressure distribution is not uniform and friction varies with vertical pressure and sliding velocity, the result would not be so simple. Nevertheless, to first approximation, the steady state sliding velocity is approximately equal for the tread elements that have nearly the same vertical load in the heavily laden area of the contact patch. This means that a single friction factor can be used to represent the entire sliding region. (There does not need to be a different value of μ for each tread element in this simplified model.)

Equations (5), (8), (9), and (10) represent a very simplified model of highly complicated elastic and frictional processes between the tire (a complex structure) and the road, which may have random frictional characteristics due to dirt, liquid contamination, variable composition, and nonuniform texture from one contact patch area to another. Nevertheless, this model has proven to be quite satisfactory for simulating passenger car tires and, when combined with lateral slip (slip angle) effects, it has been very useful in simulating combined braking and steering maneuvers [4].

As a practical matter, given the assumptions made in the model, its parameters need to be evaluated as functions of vertical load and forward velocity. Vertical load influences the contact patch length and the rolling radius of the tire. This means that the longitudinal stiffness Cs needs to be evaluated as a function of vertical load. It also means that the value of longitudinal slip varies because the rolling radius changes as the vertical load changes. In addition, the friction factor varies with load and sliding velocity, thereby making it necessary to account for these effects as a function of load and velocity. Fortunately, test data are often measured at various loads and velocities, thereby facilitating the determination of the friction factor given by equation 10. In practice, it is convenient to determine muo, muf, and Vf such that the model does a good job of fitting the peak and slide longitudinal force values for a given set of data or for a desired set of tire characteristics.

In addition to the longitudinal force characteristics of tires, a vehicle braking simulation must account for the change in the rolling radius of tires and thus the radial compliance of tires must be modeled. Specifically, the locations and velocities of the wheel centers are computed, and these quantities are used to determine the vertical forces between the tire and the road and the "equal but opposite" forces accelerating the unsprung masses. The vertical force versus deflection property of the tire is represented by a spring constant measured under rolling conditions. A small amount of viscous damping (approximately 35 lbs-sec/in for a 10 x 20 truck tire) is included, thereby providing a relatively small, dissipative force opposing wheel-hop motions. This small amount of tire damping is included to prevent the prediction of transient wheel-hop oscillations in response to rapid changes in vertical motion. Experimental results from tire tests under conditions of varying vertical load, as well as the examination of vehicle test data from antilock braking studies, indicate that a certain amount of damping is present in the tire.

A Semiempirical Model of the Lateral Force Properties of Truck Tires

A nonobvious, but nevertheless, straightforward analogy exists between the role of longitudinal slip in determining braking force and the role of slip angle in determining lateral force. Again the concept of an adhesion region is central to the arguments leading to the development of a semiempirical model. The basic idea is that points along the "equatorial" line of the tire-road contact patch lie along the direction of the velocity vector of the wheel, that is, a point at the bottom of the tread adheres to the ground as long as that point remains in the adhesion region of the contact patch. These points, that are adhering to the ground, represent the end of tread elements that are connected to a section of the carcass, which is essentially parallel to the wheel plane (even through the carcass is deflected out of the wheel plane in the vicinity of the contact patch). If there is no longitudinal slip present and the tire is operated at a small slip angle, α, the lateral deformation of the tread is approximated by the situation illustrated in Figure 7.

Point C represents the location of the carcass end of a tread element that entered the contact patch at a time equal to x/u seconds ago. The end of this tread element is contacting the ground at point P. That is, the tread element at a distance x from the front of the contact patch is deflected laterally by a distance equal to $x \cdot \tan\alpha$; hence, $\delta_y(x) = x \tan\alpha$

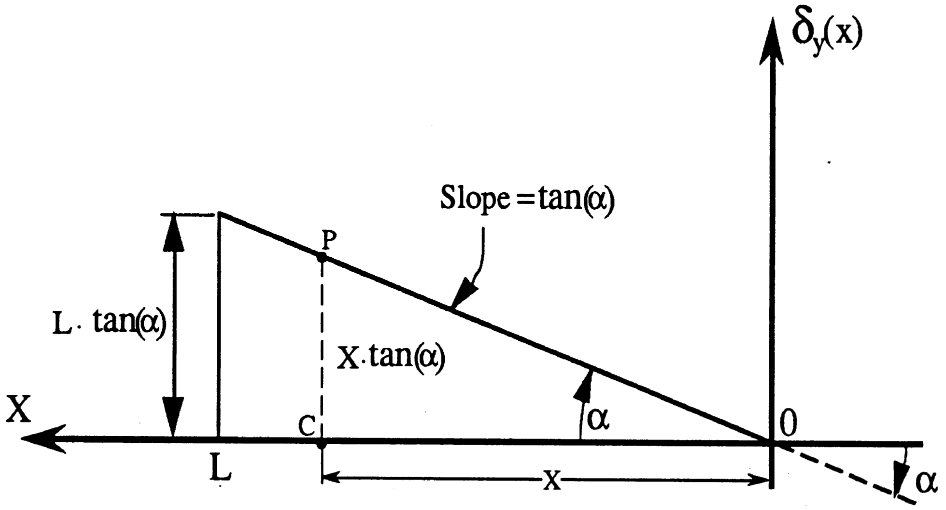


Figure 7. Lateral deformation of the tread elements, no sliding in the contact patch, s = o.

Now let us define a lateral stiffness, k_y, per unit area of the contact patch. Then the lateral shear force can be calculated by integrating the shear stresses, $k_y \delta_y(x)$, over the contact patch; viz.,

$$F_{y(\alpha)} = - \int_o^L k_y(x \tan \alpha) Lw dx$$

$$= - \frac{k_y L^2 w}{2} \tan \alpha$$

$$= C_\alpha \tan \alpha$$

where

$$C_\alpha = - (k_y L^2 w/2)$$

(Note that the algebraic signs have been chosen in this case, such that

$$C_\alpha = \frac{\partial F_y}{\partial \alpha} \bigg|_{a=0}$$

i.e., lateral force is of a polarity opposite to the polarity of the slip angle.)

At this point, the analogy between modeling longitudinal and lateral force should be fairly apparent. The quantity, C_α, the tire cornering stiffness, is similar to C_s, the longitudinal stiffness. The analysis of lateral force can be extended to include a sliding region as before. The resulting equations are the same as those for longitudinal force except that C_s is replaced with C_α and s/l-s is replaced by tan α.

The difficulties in knowing how to represent the limiting frictional characteristics of truck tires pertain to lateral force properties as well as to longitudinal force properties. However, the limiting values of tire lateral force are rarely encountered by heavy vehicles except on slippery surfaces. In practice, the frictional qualities derived from longitudinal force data are often used in lateral force calculations.

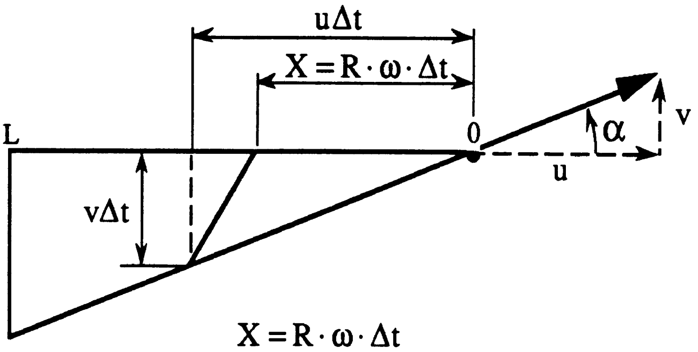
In computerized models for simulating the directional response to steering, the truck tire is often represented by its cornering and aligning torque stiffnesses with these stiffnesses varying as functions of vertical load. Clearly, the exclusive use of these stiffness coefficients is only appropriate for simulating small disturbances or moderate maneuvers. Although the influence of vertical load on contact patch length was not considered in the development of the semiempirical models, the influence of vertical load variations can be included by treating the model parameters as functions of load. The essential idea behind this simplified approach is to represent tire characteristics as accurately as possible over a limited range of values adequate for studying particular steering maneuvers of special interest.

Combined Longitudinal and Lateral Slip

Only a small amount of shear force data has been gathered on truck tires undergoing combined longitudinal and lateral slip [6]. To make predictions of vehicle performance in maneuvers, such as braking-in-a-turn, for example, the influences of both longitudinal and lateral slip on both longitudinal and lateral force need to be represented in a computerized model of the vehicle. Since little or no data are available for this situation, simulation users and developers have resorted to simple theoretical approaches for extrapolating from the available longitudinal and lateral force data to the combined slip case.

A tabular function approach can be used to provide a very general means for representing the influence of combined longitudinal and lateral slip on the shear force characteristics of truck tires. In this approach, "roll-off" factors are defined in tabular form as functions of two variables, namely, longitudinal slip and slip angle. One roll-off factor multiplies the "free-rolling" lateral force to estimate the lateral force under braking slip and the other roll-off factor multiplies the longitudinal force, computed without considering slip angle, to obtain a "rolled-off" value of force corresponding to the combined slip situation. Since little or no test data are available, the roll-off values in these tables are usually obtained from theoretical considerations, such as those used in a semiempirical model of the combined slip case.

The concepts employed in the previously described semiempirical models that are applicable to a longitudinally slipping tire or a laterally slipping tire have been extended to treat the combined slip case. Figure 8 illustrates the deflection pattern that is predicted for the adhesion region. Note that the presence of longitudinal slip increases the amount of lateral deflection at an arbitrary point in the adhesion region. Hence, a small amount of braking can cause an increase in side force at low slip angles. Aside from this interaction and the need to treat friction as a two-dimensional quantity, the development of the semiempirical model is straightforward even though it requires considerable attention to algebraic detail.



$$X = R \cdot \omega \cdot \Delta t$$

$$\delta_y(x) = v \cdot \Delta t$$

$$\delta_x(x) = (u - R \cdot \omega) \cdot \Delta t$$

$$\delta_y(x) = \frac{x \cdot \tan(\alpha)}{1-s}$$

$$\delta_x(x) = \frac{s \cdot x}{1-s}$$

Figure 8. Combined slip model

When there is both longitudinal and lateral slip and their levels are sufficient to cause sliding in the contact patch, the friction factor has a directional aspect. The total sliding velocity is given by the following equation:

$$Vs = [(u - R\omega)^2 + (v)^2]^{0.5} \qquad (12)$$

The angle of friction θ pertains to the direction of sliding such that:

$$\sin\theta = v/Vs \text{ and } \cos\theta = (u - R\omega)/Vs.$$

To account for the directional influence of the friction factor, there is a longitudinal component and a lateral component of the friction such that:

$$\mu_x = \mu \cos\theta \text{ and } \mu_y = \mu \sin\theta.$$

These directional friction factors are used in dividing the contact patch into regions of adhesion and sliding (either longitudinally, laterally, or both) per the following equations for the fraction of the contact patch that is in adhesion longitudinally or laterally:

$$(x_s/L)_x = \mu_x\, Fz(1-s)/2\, C_s\, s \qquad (13)$$

$$(x_s/L)_y = \mu_y\, Fz(1-s)/2\, C_\alpha \tan\alpha \qquad (14)$$

Based upon equations 13 and 14, the equations for longitudinal and lateral force under combined slip are now as follows:

$$Fx = C_s\ (x_s/L)_x^2\, s/(1-s)] + [(1 - (x_s/L)_x)\, \mu_x\, Fz] \qquad (15)$$

$$Fy = -[C_\alpha\ (x_s/L)_y^2 \tan\alpha/(1-s)] - [(1 - (x_s/L)_y)\, \mu_y\, Fz]\ \mathrm{sign}\{\alpha\} \qquad (16)$$

(where sufficient checks are made to avoid dividing by zero or using values of $(x_s/L) > 1$).

The aligning torque is difficult to predict accurately using a simple theoretical model. However, semiempirical results can be obtained using empirically obtained values of Xp (the pneumatic trail) and Cy (the lateral deflection stiffness of the tire). In this approach, the aligning torque, A_T, is approximated as follows:

$$A_T = -Xp \{Fya [4(x_s/L)_y - 3] + Fys \, 3 \, (x_s/L)_y\} + Fx \, Fy / Cy$$

where $Fya = -[C_\alpha \, (x_s/L)_y{}^2 \tan \alpha/(1-s)]$ and $Fys = -[(1 - (x_s/L)_y) \, \mu_y \, Fz] \, \mathrm{sign}\{\alpha\}$. (Further study of tire modeling is needed to develop a better understanding of the factors influencing aligning torque.)

Summary

This Appendix addresses the subject of representing the shear force properties of truck tires in computerized models of commercial vehicles. Emphasis has been placed on interpreting the meaning of slip angle and longitudinal slip in terms of simplified descriptions of the elastic properties of the tire and the adhesion characteristics of the tire-road interface. This approach to interpreting slip angle and longitudinal slip serves to illustrate the analogies that exist between longitudinal and lateral slip and the generation of longitudinal and lateral force.

Semiempirical models for representing the longitudinal, lateral, and combined longitudinal and lateral force situations have been presented. The derivation of the equations for the tire model is detailed, but straightforward (once the assumptions are understood). The primary assumptions are:

1) The contact patch can be divided into a sliding region and an adhesion region,
2) the shear force generated in the adhesion region depends upon elastic properties of the tire, and
3) the shear force generated in the sliding region depends upon the frictional properties of the tire-road interface.

The simplified tire model described here differs from previous versions in three main respects: (1) aligning torque is approximated even in the case of combined longitudinal and lateral slip, (2) the resultant force produced by the sliding portion of the contact patch opposes the direction of sliding, and (3) frictional characteristics are computed to match a desired μ-slip curve.

The insights into tire performance properties as provided by these models should be very useful in (a) interpreting differences in the measured characteristics of various tires and (b) understanding how tire properties interact with vehicle motion variables in dynamic maneuvers.

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APPENDIX B

TIRE EQUATIONS USED IN THE SPREAD SHEET

The letters in parentheses at the right border (for example, (G) after the equation for Vs) indicate the applicable columns of the example spread sheet shown in Figure 1.

A. Sliding Velocity

$$Vs = ((s)^2 + (\tan \alpha)^2)^{0.5} u \qquad \text{(G)}$$

where Vs = sliding velocity, s = longitudinal slip, α = slip angle, and u = forward velocity component in the wheel plane.

B. Friction

$$mu = muf + (muo - muf) e^{-Vs/Vf} \qquad \text{(H)}$$

where mu = frictional potential, muf = minimum friction at high sliding velocity, muo = maximum friction at zero sliding velocity, Vf = exponential velocity constant for "shaping" the mu versus s curve.

In general, Vf = [Vs/(ln((muo - muf)/(mu - muf))] (H15)

Example 1. For muo = 0.9, muf = 0.4, and mu = 0.5 at 45 mph (66 ft/sec),

$$0.5 = 0.4 + (0.9 - 0.4)\, e^{-66/Vf}$$

or, Vf = 66/(ln(0.5/0.1)) = 41 ft/sec. for a "0.9 surface."

Note:

- For this example, 0.5 = the locked wheel (s =1) value when the tire is sliding at 66 ft/sec. In the next example, 0.25 = the locked wheel value.

Example 2. For muo = 0.5, muf = 0.2, and mu = 0.25 at 45 mph (66 ft/sec),

$$0.25 = 0.2 + (0.5 - 0.2)\, e^{-66/Vf}$$

or, Vf = 66/(ln(0.3/0.05)) = 36.8 ft/sec for a "0.5 surface."

C. Direction of Sliding and Friction Factors for Combined Slip

$$Vs = ((u - R\omega)^2 + (v)^2)^{0.5} \qquad \text{(G)}$$

where v = u tan α , ω = the angular velocity of the wheel, and R = the rolling radius.

The angle of friction θ defines the direction of sliding such that:

$$\sin\theta = v/Vs \qquad \text{(I)}$$

$$\text{and, } \cos\theta = (u - R\omega)/ Vs \qquad \text{(J)}$$

The longitudinal friction factor is:

$$mux = mu \cos\theta \qquad \text{(N)}$$

The lateral friction factor is:

$$muy = mu \sin\theta \qquad \text{(K)}$$

Notes:

• Force components under total sliding oppose the direction of sliding. That is, θ defines the direction of sliding with respect to the wheel plane.

• The total friction is divided into lateral and longitudinal friction factors (capabilities). These factors determine the maximum amount of frictional force that can be generated in any direction.

D. Longitudinal and Lateral Fractions of the Contact Patch that Are in Adhesion

Longitudinally, for $1 \geq s > 0$,

$$(xsx/L)' = [(mux)\, Fz\, (1 - s)] / [2\, C_S\, s] \qquad \text{(N)}$$

where xsx = the point in the contact where longitudinal sliding starts (and adhesion ends), L = the length of the contact patch, Fz = the vertical load, C_S = the longitudinal stiffness of the tire.

Note:

• In the spread sheet, $C_S = 10\, Fz - Fz^2/3000$ lbs. (E)

Laterally, for $\alpha \neq 0$,

$$(xsy/L)' = [(muy)\, Fz\, (1 - s)] / [2\, C_{alpha}\, |\tan\alpha|] \qquad \text{(N)}$$

where xsy = the point in the contact where lateral sliding starts (and adhesion ends), L = the length of the contact patch, Fz = the vertical load, C_{alpha} = the lateral stiffness of the tire.

Note:

• In the spread sheet, $C_{alpha} = 0.9\ C_S$ lbs. (F)

If $(xsx/L)' > 1$, $(xsx/L) = 1$; otherwise, $(xsx/L) = (xsx/L)'$ (O)

If $(xsy/L)' > 1$, $(xsy/L) = 1$; otherwise, $(xsy/L) = (xsy/L)'$ (L)

Notes:

• If $(xsx/L)' \geq 1$, the entire contact patch is in adhesion longitudinally.

• If $(xsy/L)' \geq 1$, the entire contact patch is in adhesion laterally.

• The regions of adhesion can be different longitudinally and laterally. In the longitudinal adhesion region, C_s applies, and in the lateral adhesion region, C_{alpha} applies.

E. Longitudinal and Lateral Forces

$$Fx = [C_s\ (xsx/L)^2\ (s/(1 - s)) + (1 - (xsx/L))\ (mux)\ Fz] \quad \text{(P)}$$

where Fx = the braking force for $1 > s > 0$. If $s = 0$, $Fx = 0$. If $s = 1$, $Fx = (mux)\ Fz$.

$$Fy = [C_{alpha}\ (xsy/L)^2\ (\tan\alpha/(1 - s)) + (1 - (xsy/L))\ (muy)\ Fz] \quad \text{(M)}$$

where Fy = the magnitude of the lateral force for $s < 1$. If $\alpha > 0$, the lateral force is negative. If $\alpha < 0$, the lateral force is positive. If $s = 1$, $Fy = (muy)\ Fz$.

Notes:

• The spread sheet is set up to use positive slip angles and return positive values for the magnitude of the lateral force. The idea that positive slip angle produces negative lateral force (and vice versa) needs to be used in applying the spread sheet results in a simulation context.

• Aligning torque AT may also be calculated using empirically obtained values for the pneumatic trail xp and the lateral deflection stiffness Cy for the tire: viz.,

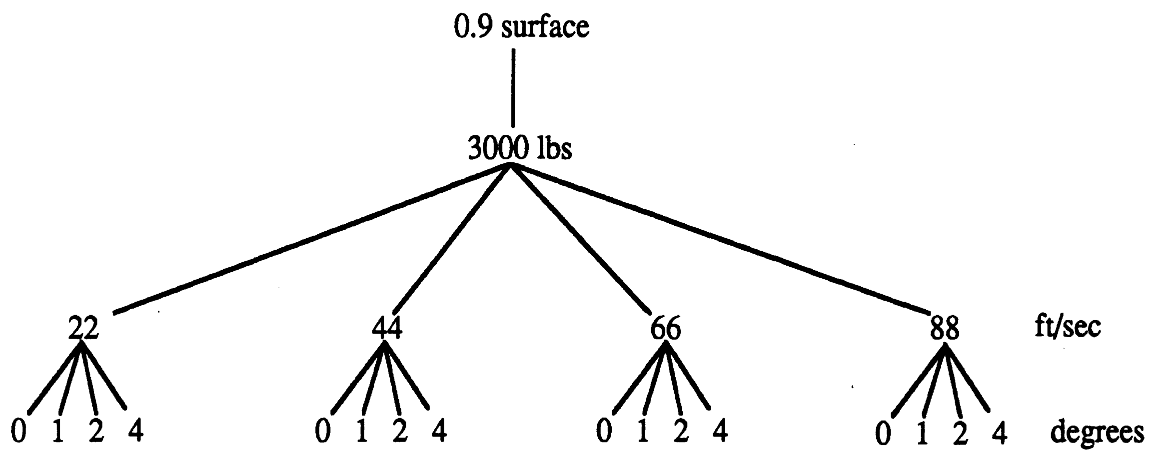
$$AT = -\ xp\{Fya[(4)\ (xsy/L) - 3] + 3\ Fys\ (xsy/L)\} + Fx\ Fy\ /\ Cy$$

where $Fya = -[Calpha\ (xsy/L)^2 \tan\alpha/(1-s)]$ and $Fys = -[(1 - (xsy/L))(muy)Fz]\ \mathrm{sign}(\alpha)$.

APPENDIX C

GENERIC TRUCK TIRE DATA FOR A "0.9 SURFACE"

The first set of data is for Fz = 3000 lbs per the following chart. There are similar sets of data for Fz = 6000 and 9000 lbs.



.9 - 3000 - 22 - 0

	A	B	C	D	E	F	G	H
1	s	tan alpha	u	Fz	Cs	Calpha	Vs	mu
2	0.00001	1.7453E-08	22	3000	27000	24300	0.00022	0.89999732
3	0.05	1.7453E-08	22	3000	27000	24300	1.1	0.88676372
4	0.1	1.7453E-08	22	3000	27000	24300	2.2	0.87387784
5	0.2	1.7453E-08	22	3000	27000	24300	4.4	0.84912041
6	0.25	1.7453E-08	22	3000	27000	24300	5.5	0.83723104
7	0.3	1.7453E-08	22	3000	27000	24300	6.6	0.82565642
8	0.35	1.7453E-08	22	3000	27000	24300	7.7	0.8143882
9	0.4	1.7453E-08	22	3000	27000	24300	8.8	0.80341829
10	0.5	1.7453E-08	22	3000	27000	24300	11	0.78234197
11	0.6	1.7453E-08	22	3000	27000	24300	13.2	0.76236677
12	0.75	1.7453E-08	22	3000	27000	24300	16.5	0.73434356
13	0.99999	1.7453E-08	22	3000	27000	24300	21.99978	0.69237233
14								
15	alpha (deg)=	0.000001	muo=	0.9	muf=	0.4	Vf=	41
16								
17	s	Fy	Fx					
18	0.00001	0.00042412	0.2700027					
19	0.05	0.00044644	1415.23716					
20	0.1	0.00034649	2048.88666					
21	0.2	0.000199	2307.02607					
22	0.25	0.00016176	2336.45417					
23	0.3	0.00013554	2344.41482					
24	0.35	0.00011615	2340.52216					
25	0.4	0.00010126	2329.56974					
26	0.5	7.9948E-05	2296.02099					
27	0.6	6.5485E-05	2254.81125					
28	0.75	5.088E-05	2188.05121					
29	0.99999	3.6253E-05	2077.1166					
30								

.9 - 3000 - 22 - 1

	A	B	C	D	E	F	G	H
1	s	tan alpha	u	Fz	Cs	Calpha	Vs	mu
2	0.00001	0.01745506	22	3000	27000	24300	0.38401135	0.8953388
3	0.05	0.01745506	22	3000	27000	24300	1.16510286	0.88599141
4	0.1	0.01745506	22	3000	27000	24300	2.23326323	0.87349354
5	0.2	0.01745506	22	3000	27000	24300	4.41672556	0.84893723
6	0.25	0.01745506	22	3000	27000	24300	5.51338958	0.83708828
7	0.3	0.01745506	22	3000	27000	24300	6.61116213	0.82554055
8	0.35	0.01745506	22	3000	27000	24300	7.70956968	0.81429149
9	0.4	0.01745506	22	3000	27000	24300	8.80837469	0.80333589
10	0.5	0.01745506	22	3000	27000	24300	11.0067009	0.78227949
11	0.6	0.01745506	22	3000	27000	24300	13.2055846	0.76231742
12	0.75	0.01745506	22	3000	27000	24300	16.504468	0.73430712
13	0.99999	0.01745506	22	3000	27000	24300	22.0031312	0.69234843
14								
15	alpha (deg)=	1	muo=	0.9	muf=	0.4	Vf=	41
16								
17	s	Fy	Fx					
18	0.00001	424.162168	0.2700027					
19	0.05	446.3219	1401.58518					
20	0.1	342.891307	2026.12632					
21	0.2	198.312261	2298.75179					
22	0.25	161.387154	2330.83672					
23	0.3	135.317177	2340.37005					
24	0.35	116.00657	2337.47872					
25	0.4	101.16319	2327.20107					
26	0.5	79.9028211	2294.47501					
27	0.6	65.4606404	2253.72753					
28	0.75	50.8685053	2187.35514					
29	0.99999	36.2497805	2076.72855					
30								

.9 - 3000 - 22 - 2

	A	B	C	D	E	F	G	H
1	s	tan alpha	u	Fz	Cs	Calpha	Vs	mu
2	0.00001	0.03492076	22	3000	27000	24300	0.76825669	0.89071825
3	0.05	0.03492076	22	3000	27000	24300	1.34172213	0.88390237
4	0.1	0.03492076	22	3000	27000	24300	2.33028288	0.87237442
5	0.2	0.03492076	22	3000	27000	24300	4.46656672	0.84839182
6	0.25	0.03492076	22	3000	27000	24300	5.553397	0.83666198
7	0.3	0.03492076	22	3000	27000	24300	6.64456306	0.82519402
8	0.35	0.03492076	22	3000	27000	24300	7.73823095	0.81400198
9	0.4	0.03492076	22	3000	27000	24300	8.83347147	0.80308908
10	0.5	0.03492076	22	3000	27000	24300	11.0267955	0.78209217
11	0.6	0.03492076	22	3000	27000	24300	13.2223379	0.7621694
12	0.75	0.03492076	22	3000	27000	24300	16.5178757	0.73419782
13	0.99999	0.03492076	22	3000	27000	24300	22.0131901	0.69227672
14								
15	alpha (deg)=	2	muo=	0.9	muf=	0.4	Vf=	41
16								
17	s	Fy	Fx					
18	0.00001	848.582881	0.2700027					
19	0.05	873.11429	1342.52094					
20	0.1	665.428218	1962.06436					
21	0.2	392.605263	2274.41898					
22	0.25	320.590409	2314.20027					
23	0.3	269.335422	2328.34314					
24	0.35	231.187901	2328.40677					
25	0.4	201.775539	2320.12892					
26	0.5	159.532962	2289.85007					
27	0.6	130.772895	2250.48197					
28	0.75	101.671018	2185.26867					
29	0.99999	72.4810098	2075.56459					
30								

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	A	B	C	D	E	F	G	H
1	s	tan alpha	u	Fz	Cs	Calpha	Vs	mu
2	0.00001	0.06992679	22	3000	27000	24300	1.53838933	0.88158676
3	0.05	0.06992679	22	3000	27000	24300	1.89120112	0.87746041
4	0.1	0.06992679	22	3000	27000	24300	2.68451889	0.86831073
5	0.2	0.06992679	22	3000	27000	24300	4.66118458	0.84626845
6	0.25	0.06992679	22	3000	27000	24300	5.71109811	0.83498564
7	0.3	0.06992679	22	3000	27000	24300	6.77691978	0.82382362
8	0.35	0.06992679	22	3000	27000	24300	7.85217433	0.81285302
9	0.4	0.06992679	22	3000	27000	24300	8.93345631	0.80210728
10	0.5	0.06992679	22	3000	27000	24300	11.1070537	0.78134495
11	0.6	0.06992679	22	3000	27000	24300	13.2893432	0.761578
12	0.75	0.06992679	22	3000	27000	24300	16.5715612	0.7337605
13	0.99999	0.06992679	22	3000	27000	24300	22.0535023	0.69198949
14								
15	alpha (deg)=	4	muo=	0.9	muf=	0.4	Vf=	41
16								
17	s	Fy	Fx					
18	0.00001	1615.65822	0.24576682					
19	0.05	1500.4313	1118.68294					
20	0.1	1197.71136	1755.00466					
21	0.2	755.276003	2183.82631					
22	0.25	624.516728	2250.71358					
23	0.3	528.617719	2281.78385					
24	0.35	455.931355	2292.96922					
25	0.4	399.223572	2292.33684					
26	0.5	316.90804	2271.5432					
27	0.6	260.366698	2237.58343					
28	0.75	202.815789	2176.94889					
29	0.99999	144.813598	2070.91101					
30								

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	A	B	C	D	E	F	G	H
1	s	tan alpha	u	Fz	Cs	Calpha	Vs	mu
2	0.00001	1.7453E-08	44	3000	27000	24300	0.00044	0.89999463
3	0.05	1.7453E-08	44	3000	27000	24300	2.2	0.87387784
4	0.1	1.7453E-08	44	3000	27000	24300	4.4	0.84912041
5	0.2	1.7453E-08	44	3000	27000	24300	8.8	0.80341829
6	0.25	1.7453E-08	44	3000	27000	24300	11	0.78234197
7	0.3	1.7453E-08	44	3000	27000	24300	13.2	0.76236677
8	0.35	1.7453E-08	44	3000	27000	24300	15.4	0.74343516
9	0.4	1.7453E-08	44	3000	27000	24300	17.6	0.72549263
10	0.5	1.7453E-08	44	3000	27000	24300	22	0.69237076
11	0.6	1.7453E-08	44	3000	27000	24300	26.4	0.66261935
12	0.75	1.7453E-08	44	3000	27000	24300	33	0.62357123
13	0.99999	1.7453E-08	44	3000	27000	24300	43.99956	0.57096316
14								
15	alpha (deg)=	0.000001	muo=	0.9	muf=	0.4	Vf=	41
16								
17	s	Fy	Fx					
18	0.00001	0.00042412	0.2700027					
19	0.05	0.00044644	1412.50126					
20	0.1	0.00033973	2006.60713					
21	0.2	0.00018947	2195.09454					
22	0.25	0.00015198	2194.01117					
23	0.3	0.00012575	2174.0886					
24	0.35	0.00010648	2144.76923					
25	0.4	9.1777E-05	2110.68543					
26	0.5	7.0955E-05	2037.16418					
27	0.6	5.7036E-05	1963.46559					
28	0.75	4.3254E-05	1859.91254					
29	0.99999	2.9896E-05	1712.88921					
30								

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	A	B	C	D	E	F	G	H
1	s	tan alpha	u	Fz	Cs	Calpha	Vs	mu
2	0.00001	0.01745506	44	3000	27000	24300	0.76802271	0.89072105
3	0.05	0.01745506	44	3000	27000	24300	2.33020572	0.87237531
4	0.1	0.01745506	44	3000	27000	24300	4.46652647	0.84839226
5	0.2	0.01745506	44	3000	27000	24300	8.83345112	0.80308928
6	0.25	0.01745506	44	3000	27000	24300	11.0267792	0.78209232
7	0.3	0.01745506	44	3000	27000	24300	13.2223243	0.76216952
8	0.35	0.01745506	44	3000	27000	24300	15.4191394	0.74327488
9	0.4	0.01745506	44	3000	27000	24300	17.6167494	0.72535968
10	0.5	0.01745506	44	3000	27000	24300	22.0134018	0.69227521
11	0.6	0.01745506	44	3000	27000	24300	26.4111692	0.66254782
12	0.75	0.01745506	44	3000	27000	24300	33.008936	0.6235225
13	0.99999	0.01745506	44	3000	27000	24300	44.0062625	0.57093521
14								
15	alpha (deg)=	1	muo=	0.9	muf=	0.4	Vf=	41
16								
17	s	Fy	Fx					
18	0.00001	424.162168	0.2700027					
19	0.05	445.965438	1396.80962					
20	0.1	336.043823	1983.40179					
21	0.2	188.78333	2186.78527					
22	0.25	151.61431	2188.40364					
23	0.3	125.534915	2170.07592					
24	0.35	106.340866	2141.76956					
25	0.4	91.6858844	2108.36677					
26	0.5	70.9108525	2035.67279					
27	0.6	57.0119721	1962.43632					
28	0.75	43.2435865	1859.26751					
29	0.99999	29.8928631	1712.5445					
30								

	A	B	C	D	E	F	G	H
1	s	tan alpha	u	Fz	Cs	Calpha	Vs	mu
2	0.00001	0.03492076	44	3000	27000	24300	1.53651337	0.8816088
3	0.05	0.03492076	44	3000	27000	24300	2.68344427	0.868323
4	0.1	0.03492076	44	3000	27000	24300	4.66056575	0.84627518
5	0.2	0.03492076	44	3000	27000	24300	8.93313344	0.80211045
6	0.25	0.03492076	44	3000	27000	24300	11.106794	0.78134737
7	0.3	0.03492076	44	3000	27000	24300	13.2891261	0.76157991
8	0.35	0.03492076	44	3000	27000	24300	15.4764619	0.74279528
9	0.4	0.03492076	44	3000	27000	24300	17.6669429	0.72496161
10	0.5	0.03492076	44	3000	27000	24300	22.0535909	0.69198886
11	0.6	0.03492076	44	3000	27000	24300	26.4446757	0.66233335
12	0.75	0.03492076	44	3000	27000	24300	33.0357514	0.62337636
13	0.99999	0.03492076	44	3000	27000	24300	44.0263802	0.57085136
14								
15	alpha (deg)=	2	muo=	0.9	muf=	0.4	Vf=	41
16								
17	s	Fy	Fx					
18	0.00001	848.582881	0.2700027					
19	0.05	868.897171	1333.25485					
20	0.1	651.249171	1918.12919					
21	0.2	373.517541	2162.35331					
22	0.25	301.039946	2171.79869					
23	0.3	249.774482	2158.1458					
24	0.35	211.862721	2132.82901					
25	0.4	182.827643	2101.44459					
26	0.5	141.554731	2031.21155					
27	0.6	113.879805	1959.35406					
28	0.75	86.4236306	1857.33418					
29	0.99999	59.7678407	1711.51055					
30								

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	A	B	C	D	E	F	G	H
1	s	tan alpha	u	Fz	Cs	Calpha	Vs	mu
2	0.00001	0.06992679	44	3000	27000	24300	3.07677865	0.86385162
3	0.05	0.06992679	44	3000	27000	24300	3.78240224	0.85593688
4	0.1	0.06992679	44	3000	27000	24300	5.36903778	0.83862988
5	0.2	0.06992679	44	3000	27000	24300	9.32236916	0.79831105
6	0.25	0.06992679	44	3000	27000	24300	11.4221962	0.77842502
7	0.3	0.06992679	44	3000	27000	24300	13.5538396	0.75925292
8	0.35	0.06992679	44	3000	27000	24300	15.7043487	0.74089524
9	0.4	0.06992679	44	3000	27000	24300	17.8669126	0.72338053
10	0.5	0.06992679	44	3000	27000	24300	22.2141074	0.69084794
11	0.6	0.06992679	44	3000	27000	24300	26.5786863	0.6614773
12	0.75	0.06992679	44	3000	27000	24300	33.1431225	0.62279215
13	0.99999	0.06992679	44	3000	27000	24300	44.1070045	0.57051572
14								
15	alpha (deg)=	4	muo=	0.9	muf=	0.4	Vf=	41
16								
17	s	Fy	Fx					
18	0.00001	1603.44181	0.24343362					
19	0.05	1478.96117	1101.11057					
20	0.1	1166.51224	1707.55235					
21	0.2	716.892722	2071.44206					
22	0.25	585.38556	2108.46214					
23	0.3	489.526686	2111.98078					
24	0.35	417.331347	2097.91834					
25	0.4	361.381552	2074.25178					
26	0.5	280.997149	2013.55834					
27	0.6	226.614449	1947.10801					
28	0.75	172.340633	1849.62688					
29	0.99999	119.392619	1707.37757					
30								

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	A	B	C	D	E	F	G	H
1	s	tan alpha	u	Fz	Cs	Calpha	V s	mu
2	0.00001	1.74533E-08	66	3000	27000	24300	0.000660001	0.899991951
3	0.05	1.74533E-08	66	3000	27000	24300	3.3	0.861333078
4	0.1	1.74533E-08	66	3000	27000	24300	6.6	0.825656417
5	0.2	1.74533E-08	66	3000	27000	24300	13.2	0.762366771
6	0.25	1.74533E-08	66	3000	27000	24300	16.5	0.734343556
7	0.3	1.74533E-08	66	3000	27000	24300	19.8	0.708487483
8	0.35	1.74533E-08	66	3000	27000	24300	23.1	0.68463096
9	0.4	1.74533E-08	66	3000	27000	24300	26.4	0.662619354
10	0.5	1.74533E-08	66	3000	27000	24300	33	0.623571226
11	0.6	1.74533E-08	66	3000	27000	24300	39.6	0.590329054
12	0.75	1.74533E-08	66	3000	27000	24300	49.5	0.549499198
13	0.99999	1.74533E-08	66	3000	27000	24300	65.99934	0.499969796
14								
15	alpha (deg)=	0.000001	muo=	0.9	muf=	0.4	V f =	41
16								
17	s	F y	Fx					
18	0.00001	0.000424119	0.2700027					
19	0.05	0.000446437	1409.332671					
20	0.1	0.000333162	1965.687862					
21	0.2	0.000180802	2093.365949					
22	0.25	0.000143343	2068.215553					
23	0.3	0.000117345	2027.860183					
24	0.35	9.84013E-05	1981.35295					
25	0.4	8.40758E-05	1932.97501					
26	0.5	6.40434E-05	1838.310256					
27	0.6	5.08902E-05	1751.626697					
28	0.75	3.81454E-05	1640.11011					
29	0.99999	2.61786E-05	1499.909179					
30								

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	A	B	C	D	E	F	G	H
1	s	tan alpha	u	Fz	Cs	Calpha	Vs	mu
2	0.00001	0.017455059	66	3000	27000	24300	1.152034062	0.886146348
3	0.05	0.017455059	66	3000	27000	24300	3.495308577	0.859140687
4	0.1	0.017455059	66	3000	27000	24300	6.699789702	0.824621674
5	0.2	0.017455059	66	3000	27000	24300	13.25017668	0.76192357
6	0.25	0.017455059	66	3000	27000	24300	16.54016874	0.734016151
7	0.3	0.017455059	66	3000	27000	24300	19.83348638	0.708235632
8	0.35	0.017455059	66	3000	27000	24300	23.12870904	0.684431725
9	0.4	0.017455059	66	3000	27000	24300	26.42512407	0.662458475
10	0.5	0.017455059	66	3000	27000	24300	33.0201027	0.623461634
11	0.6	0.017455059	66	3000	27000	24300	39.6167538	0.590251296
12	0.75	0.017455059	66	3000	27000	24300	49.51340406	0.54945033
13	0.99999	0.017455059	66	3000	27000	24300	66.00939374	0.499945285
14								
15	alpha (deg)=	1	muo=	0.9	muf=	0.4	Vf=	41
16								
17	s	Fy	Fx					
18	0.00001	424.1621677	0.2700027					
19	0.05	445.424424	1391.666333					
20	0.1	329.3953594	1942.096698					
21	0.2	180.1126369	2085.068434					
22	0.25	142.9754791	2062.65916					
23	0.3	117.1301549	2023.915769					
24	0.35	98.26665958	1978.428626					
25	0.4	83.98720477	1930.733755					
26	0.5	64.00067871	1836.893603					
27	0.6	50.86745248	1750.666043					
28	0.75	38.13562677	1639.523304					
29	0.99999	26.17599321	1499.60721					
30								

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	A	B	C	D	E	F	G	H
1	s	tan alpha	u	Fz	Cs	Calpha	Vs	mu
2	0.00001	0.034920757	66	3000	27000	24300	2.304770056	0.872668452
3	0.05	0.034920757	66	3000	27000	24300	4.025166404	0.853245222
4	0.1	0.034920757	66	3000	27000	24300	6.990848631	0.82161796
5	0.2	0.034920757	66	3000	27000	24300	13.39970017	0.76060607
6	0.25	0.034920757	66	3000	27000	24300	16.66019101	0.733039791
7	0.3	0.034920757	66	3000	27000	24300	19.93368919	0.707483232
8	0.35	0.034920757	66	3000	27000	24300	23.21469286	0.68383585
9	0.4	0.034920757	66	3000	27000	24300	26.50041442	0.661976951
10	0.5	0.034920757	66	3000	27000	24300	33.0803864	0.623133312
11	0.6	0.034920757	66	3000	27000	24300	39.66701356	0.59001822
12	0.75	0.034920757	66	3000	27000	24300	49.55362716	0.549303783
13	0.99999	0.034920757	66	3000	27000	24300	66.0395703	0.499871751
14								
15	alpha (deg)=	2	muo=	0.9	muf=	0.4	Vf=	41
16								
17	s	Fy	Fx					
18	0.00001	848.5828808	0.2700027					
19	0.05	864.4340779	1323.795143					
20	0.1	637.52892	1875.784887					
21	0.2	356.1713383	2060.676087					
22	0.25	283.7755487	2046.208505					
23	0.3	232.9820934	2012.190396					
24	0.35	195.7310225	1969.713821					
25	0.4	167.4453107	1924.043479					
26	0.5	127.745612	1832.656378					
27	0.6	101.5989096	1747.789533					
28	0.75	76.21270467	1637.764587					
29	0.99999	52.33631351	1498.701502					
30								

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	A	B	C	D	E	F	G	H
1	s	tan alpha	u	Fz	Cs	Calpha	V s	mu
2	0.00001	0.069926787	66	3000	27000	24300	4.61516798	0.8467696
3	0.05	0.069926787	66	3000	27000	24300	5.673603356	0.835383621
4	0.1	0.069926787	66	3000	27000	24300	8.053556671	0.810830157
5	0.2	0.069926787	66	3000	27000	24300	13.98355373	0.75550731
6	0.25	0.069926787	66	3000	27000	24300	17.13329434	0.729218897
7	0.3	0.069926787	66	3000	27000	24300	20.33075933	0.704519742
8	0.35	0.069926787	66	3000	27000	24300	23.55652298	0.681479257
9	0.4	0.069926787	66	3000	27000	24300	26.80036893	0.660067331
10	0.5	0.069926787	66	3000	27000	24300	33.32116107	0.62182679
11	0.6	0.069926787	66	3000	27000	24300	39.86802949	0.589088874
12	0.75	0.069926787	66	3000	27000	24300	49.7146837	0.548718438
13	0.99999	0.069926787	66	3000	27000	24300	66.16050677	0.499577596
14								
15	alpha (deg)=	4	muo=	0.9	muf=	0.4	V f=	41
16								
17	s	F y	Fx					
18	0.00001	1590.887769	0.24108499					
19	0.05	1457.739052	1083.867116					
20	0.1	1136.665112	1662.302608					
21	0.2	682.1859531	1969.981061					
22	0.25	550.9675462	1983.50079					
23	0.3	456.0793884	1966.843412					
24	0.35	385.2012109	1935.701998					
25	0.4	330.7365729	1897.773805					
26	0.5	253.4684355	1815.895983					
27	0.6	202.1176845	1736.364581					
28	0.75	151.9587229	1630.755108					
29	0.99999	104.5473014	1495.081674					
30								

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	A	B	C	D	E	F	G	H
1	s	tan alpha	u	Fz	Cs	Calpha	Vs	mu
2	0.00001	1.7453E-08	88	3000	27000	24300	0.00088	0.89998927
3	0.05	1.7453E-08	88	3000	27000	24300	4.4	0.84912041
4	0.1	1.7453E-08	88	3000	27000	24300	8.8	0.80341829
5	0.2	1.7453E-08	88	3000	27000	24300	17.6	0.72549263
6	0.25	1.7453E-08	88	3000	27000	24300	22	0.69237076
7	0.3	1.7453E-08	88	3000	27000	24300	26.4	0.66261935
8	0.35	1.7453E-08	88	3000	27000	24300	30.8	0.63589542
9	0.4	1.7453E-08	88	3000	27000	24300	35.2	0.6118909
10	0.5	1.7453E-08	88	3000	27000	24300	44	0.57096133
11	0.6	1.7453E-08	88	3000	27000	24300	52.8	0.53793785
12	0.75	1.7453E-08	88	3000	27000	24300	66	0.49996819
13	0.99999	1.7453E-08	88	3000	27000	24300	87.99912	0.4584568
14								
15	alpha (deg)=	0.000001	muo=	0.9	muf=	0.4	Vf=	41
16								
17	s	Fy	Fx					
18	0.00001	0.00042412	0.2700027					
19	0.05	0.00044643	1405.76923					
20	0.1	0.00032679	1926.14415					
21	0.2	0.00017292	2001.03136					
22	0.25	0.00013571	1957.26797					
23	0.3	0.00011013	1902.48443					
24	0.35	9.1662E-05	1845.10628					
25	0.4	7.7827E-05	1788.87139					
26	0.5	5.8737E-05	1685.71757					
27	0.6	4.6424E-05	1597.73704					
28	0.75	3.4725E-05	1492.961					
29	0.99999	2.4005E-05	1375.37024					
30								

	A	B	C	D	E	F	G	H
1	s	tan alpha	u	Fz	Cs	Calpha	Vs	mu
2	0.00001	0.01745506	88	3000	27000	24300	1.53604542	0.8816143
3	0.05	0.01745506	88	3000	27000	24300	4.66041144	0.84627686
4	0.1	0.01745506	88	3000	27000	24300	8.93305294	0.80211124
5	0.2	0.01745506	88	3000	27000	24300	17.6669022	0.72496193
6	0.25	0.01745506	88	3000	27000	24300	22.0535583	0.69198909
7	0.3	0.01745506	88	3000	27000	24300	26.4446485	0.66233352
8	0.35	0.01745506	88	3000	27000	24300	30.8382787	0.63567529
9	0.4	0.01745506	88	3000	27000	24300	35.2334988	0.61171785
10	0.5	0.01745506	88	3000	27000	24300	44.0268036	0.5708496
11	0.6	0.01745506	88	3000	27000	24300	52.8223384	0.53786272
12	0.75	0.01745506	88	3000	27000	24300	66.0178721	0.49992462
13	0.99999	0.01745506	88	3000	27000	24300	88.012525	0.4584377
14								
15	alpha (deg)=	1	muo=	0.9	muf=	0.4	Vf=	41
16								
17	s	Fy	Fx					
18	0.00001	424.162168	0.2700027					
19	0.05	444.714778	1386.19332					
20	0.1	322.952291	1902.22305					
21	0.2	172.234805	1992.78419					
22	0.25	135.35053	1951.79418					
23	0.3	109.91961	1898.63355					
24	0.35	91.5316313	1842.27721					
25	0.4	77.7420155	1786.7228					
26	0.5	58.6968183	1684.38347					
27	0.6	46.4031992	1596.84734					
28	0.75	34.7159775	1492.42925					
29	0.99999	24.0027509	1375.10344					
30								

	A	B	C	D	E	F	G	H
1	s	tan alpha	u	Fz	Cs	Calpha	Vs	mu
2	0.00001	0.03492076	88	3000	27000	24300	3.07302674	0.86389407
3	0.05	0.03492076	88	3000	27000	24300	5.36688854	0.83865287
4	0.1	0.03492076	88	3000	27000	24300	9.32113151	0.79832308
5	0.2	0.03492076	88	3000	27000	24300	17.8662669	0.72338562
6	0.25	0.03492076	88	3000	27000	24300	22.213588	0.69085163
7	0.3	0.03492076	88	3000	27000	24300	26.5782522	0.66148006
8	0.35	0.03492076	88	3000	27000	24300	30.9529238	0.63501721
9	0.4	0.03492076	88	3000	27000	24300	35.3338859	0.6112001
10	0.5	0.03492076	88	3000	27000	24300	44.1071819	0.57051498
11	0.6	0.03492076	88	3000	27000	24300	52.8893514	0.53763757
12	0.75	0.03492076	88	3000	27000	24300	66.0715029	0.499794
13	0.99999	0.03492076	88	3000	27000	24300	88.0527604	0.45838038
14								
15	alpha (deg)=	2	muo=	0.9	muf=	0.4	Vf=	41
16								
17	s	Fy	Fx					
18	0.00001	848.582881	0.2700027					
19	0.05	859.757116	1314.17924					
20	0.1	624.276995	1835.03343					
21	0.2	340.431665	1968.54579					
22	0.25	268.552836	1935.59139					
23	0.3	218.587787	1887.18824					
24	0.35	182.28453	1833.84754					
25	0.4	154.974899	1780.30998					
26	0.5	117.151766	1680.39356					
27	0.6	92.6799938	1594.1835					
28	0.75	69.3789926	1490.83564					
29	0.99999	47.9921886	1374.30324					
30								

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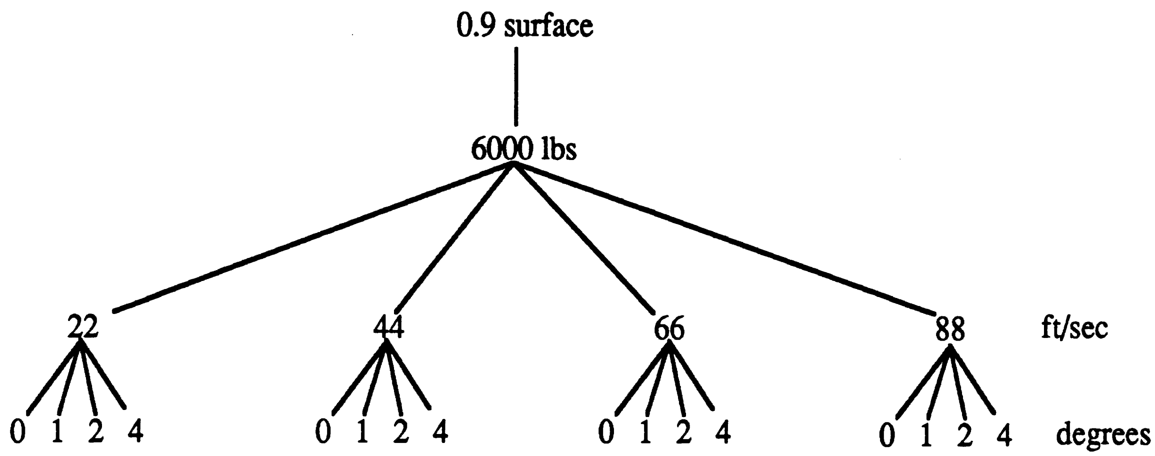
	A	B	C	D	E	F	G	H
1	s	tan alpha	u	Fz	Cs	Calpha	Vs	mu
2	0.00001	0.06992679	88	3000	27000	24300	6.15355731	0.83031665
3	0.05	0.06992679	88	3000	27000	24300	7.56480448	0.81575688
4	0.1	0.06992679	88	3000	27000	24300	10.7380756	0.78479234
5	0.2	0.06992679	88	3000	27000	24300	18.6447383	0.71730339
6	0.25	0.06992679	88	3000	27000	24300	22.8443925	0.68641099
7	0.3	0.06992679	88	3000	27000	24300	27.1076791	0.65812532
8	0.35	0.06992679	88	3000	27000	24300	31.4086973	0.63241912
9	0.4	0.06992679	88	3000	27000	24300	35.7338252	0.60914993
10	0.5	0.06992679	88	3000	27000	24300	44.4282148	0.56918505
11	0.6	0.06992679	88	3000	27000	24300	53.1573726	0.53674075
12	0.75	0.06992679	88	3000	27000	24300	66.2862449	0.49927268
13	0.99999	0.06992679	88	3000	27000	24300	88.214009	0.45815122
14								
15	alpha (deg)=	4	muo=	0.9	muf=	0.4	Vf=	41
16								
17	s	Fy	Fx					
18	0.00001	1578.06547	0.23872882					
19	0.05	1436.81721	1066.97856					
20	0.1	1108.16104	1619.21464					
21	0.2	650.851776	1878.50414					
22	0.25	520.741028	1873.87472					
23	0.3	427.503783	1842.95285					
24	0.35	358.495346	1800.96698					
25	0.4	305.954401	1755.14217					
26	0.5	232.39122	1664.61742					
27	0.6	184.356356	1583.60631					
28	0.75	138.335946	1484.48541					
29	0.99999	95.8779475	1371.10533					
30								

Appendix C - Generic Truck Tire Data for a "0.9 Surface" - Fz = 6000 lbs.



.9 - 6000 - 22 - 0

	A	B	C	D	E	F	G	H
1	s	tan alpha	u	Fz	Cs	Calpha	Vs	mu
2	0.00001	1.7453E-08	22	6000	48000	43200	0.00022	0.89999732
3	0.05	1.7453E-08	22	6000	48000	43200	1.1	0.88676372
4	0.1	1.7453E-08	22	6000	48000	43200	2.2	0.87387784
5	0.2	1.7453E-08	22	6000	48000	43200	4.4	0.84912041
6	0.25	1.7453E-08	22	6000	48000	43200	5.5	0.83723104
7	0.3	1.7453E-08	22	6000	48000	43200	6.6	0.82565642
8	0.35	1.7453E-08	22	6000	48000	43200	7.7	0.8143882
9	0.4	1.7453E-08	22	6000	48000	43200	8.8	0.80341829
10	0.5	1.7453E-08	22	6000	48000	43200	11	0.78234197
11	0.6	1.7453E-08	22	6000	48000	43200	13.2	0.76236677
12	0.75	1.7453E-08	22	6000	48000	43200	16.5	0.73434356
13	0.99999	1.7453E-08	22	6000	48000	43200	21.99978	0.69237233
14								
15	alpha (deg)=	0.000001	muo=	0.9	muf=	0.4	Vf=	41
16								
17	s	Fy	Fx					
18	0.00001	0.00075399	0.4800048					
19	0.05	0.00079367	2526.31579					
20	0.1	0.00066521	3954.5866					
21	0.2	0.00039217	4553.96836					
22	0.25	0.00032011	4629.09861					
23	0.3	0.00026893	4655.69103					
24	0.35	0.00023087	4655.3837					
25	0.4	0.00020153	4638.9682					
26	0.5	0.0001594	4579.29076					
27	0.6	0.00013071	4501.55024					
28	0.75	0.00010166	4372.35756					
29	0.99999	7.2506E-05	4154.23309					
30								

	A	B	C	D	E	F	G	H
1	s	tan alpha	u	Fz	Cs	Calpha	Vs	mu
2	0.00001	0.01745506	22	6000	48000	43200	0.38401135	0.8953388
3	0.05	0.01745506	22	6000	48000	43200	1.16510286	0.88599141
4	0.1	0.01745506	22	6000	48000	43200	2.23326323	0.87349354
5	0.2	0.01745506	22	6000	48000	43200	4.41672556	0.84893723
6	0.25	0.01745506	22	6000	48000	43200	5.51338958	0.83708828
7	0.3	0.01745506	22	6000	48000	43200	6.61116213	0.82554055
8	0.35	0.01745506	22	6000	48000	43200	7.70956968	0.81429149
9	0.4	0.01745506	22	6000	48000	43200	8.80837469	0.80333589
10	0.5	0.01745506	22	6000	48000	43200	11.0067009	0.78227949
11	0.6	0.01745506	22	6000	48000	43200	13.2055846	0.76231742
12	0.75	0.01745506	22	6000	48000	43200	16.504468	0.73430712
13	0.99999	0.01745506	22	6000	48000	43200	22.0031312	0.69234843
14								
15	alpha (deg)=	1	muo=	0.9	muf=	0.4	Vf=	41
16								
17	s	Fy	Fx					
18	0.00001	754.066076	0.4800048					
19	0.05	793.745827	2526.20324					
20	0.1	658.857039	3913.42172					
21	0.2	390.844583	4537.89971					
22	0.25	319.393275	4618.09109					
23	0.3	268.499824	4647.72256					
24	0.35	230.595075	4649.36658					
25	0.4	201.350409	4634.27334					
26	0.5	159.311716	4576.21634					
27	0.6	130.660606	4499.39066					
28	0.75	101.640233	4370.96781					
29	0.99999	72.4995591	4153.45701					
30								

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	A	B	C	D	E	F	G	H
1	s	tan alpha	u	Fz	Cs	Calpha	Vs	mu
2	0.00001	0.03492076	22	6000	48000	43200	0.76825669	0.89071825
3	0.05	0.03492076	22	6000	48000	43200	1.34172213	0.88390237
4	0.1	0.03492076	22	6000	48000	43200	2.33028288	0.87237442
5	0.2	0.03492076	22	6000	48000	43200	4.46656672	0.84839182
6	0.25	0.03492076	22	6000	48000	43200	5.553397	0.83666198
7	0.3	0.03492076	22	6000	48000	43200	6.64456306	0.82519402
8	0.35	0.03492076	22	6000	48000	43200	7.73823095	0.81400198
9	0.4	0.03492076	22	6000	48000	43200	8.83347147	0.80308908
10	0.5	0.03492076	22	6000	48000	43200	11.0267955	0.78209217
11	0.6	0.03492076	22	6000	48000	43200	13.2223379	0.7621694
12	0.75	0.03492076	22	6000	48000	43200	16.5178757	0.73419782
13	0.99999	0.03492076	22	6000	48000	43200	22.0131901	0.69227672
14								
15	alpha (deg)=	2	muo=	0.9	muf=	0.4	Vf=	41
16								
17	s	Fy	Fx					
18	0.00001	1508.59179	0.4800048					
19	0.05	1584.92192	2477.17699					
20	0.1	1281.50767	3796.94392					
21	0.2	773.918274	4490.63175					
22	0.25	634.520589	4585.48762					
23	0.3	534.446856	4624.02729					
24	0.35	459.561788	4631.42996					
25	0.4	401.610813	4620.25553					
26	0.5	318.081839	4567.01891					
27	0.6	261.025805	4492.92309					
28	0.75	203.148793	4366.80206					
29	0.99999	144.962016	4151.12907					
30								

	A	B	C	D	E	F	G	H
1	s	tan alpha	u	Fz	Cs	Calpha	Vs	mu
2	0.00001	0.06992679	22	6000	48000	43200	1.53838933	0.88158676
3	0.05	0.06992679	22	6000	48000	43200	1.89120112	0.87746041
4	0.1	0.06992679	22	6000	48000	43200	2.68451889	0.86831073
5	0.2	0.06992679	22	6000	48000	43200	4.66118458	0.84626845
6	0.25	0.06992679	22	6000	48000	43200	5.71109811	0.83498564
7	0.3	0.06992679	22	6000	48000	43200	6.77691978	0.82382362
8	0.35	0.06992679	22	6000	48000	43200	7.85217433	0.81285302
9	0.4	0.06992679	22	6000	48000	43200	8.93345631	0.80210728
10	0.5	0.06992679	22	6000	48000	43200	11.1070537	0.78134495
11	0.6	0.06992679	22	6000	48000	43200	13.2893432	0.761578
12	0.75	0.06992679	22	6000	48000	43200	16.5715612	0.7337605
13	0.99999	0.06992679	22	6000	48000	43200	22.0535023	0.69198949
14								
15	alpha (deg)=	4	muo=	0.9	muf=	0.4	Vf=	41
16								
17	s	Fy	Fx					
18	0.00001	2974.04092	0.45842073					
19	0.05	2840.64566	2134.26144					
20	0.1	2321.65522	3415.06607					
21	0.2	1489.89255	4314.47269					
22	0.25	1236.47358	4461.01388					
23	0.3	1049.1313	4532.27613					
24	0.35	906.405599	4561.35572					
25	0.4	794.657641	4565.1644					
26	0.5	631.877592	4530.61165					
27	0.6	519.704227	4467.21924					
28	0.75	405.247582	4350.19108					
29	0.99999	289.627188	4141.82193					
30								

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	A	B	C	D	E	F	G	H
1	s	tan alpha	u	Fz	Cs	Calpha	Vs	mu
2	0.00001	1.74533E-08	44	6000	48000	43200	0.000440001	0.899994634
3	0.05	1.74533E-08	44	6000	48000	43200	2.2	0.873877838
4	0.1	1.74533E-08	44	6000	48000	43200	4.4	0.84912041
5	0.2	1.74533E-08	44	6000	48000	43200	8.8	0.803418285
6	0.25	1.74533E-08	44	6000	48000	43200	11	0.782341969
7	0.3	1.74533E-08	44	6000	48000	43200	13.2	0.762366771
8	0.35	1.74533E-08	44	6000	48000	43200	15.4	0.743435164
9	0.4	1.74533E-08	44	6000	48000	43200	17.6	0.725492626
10	0.5	1.74533E-08	44	6000	48000	43200	22	0.692370763
11	0.6	1.74533E-08	44	6000	48000	43200	26.4	0.662619354
12	0.75	1.74533E-08	44	6000	48000	43200	33	0.623571226
13	0.99999	1.74533E-08	44	6000	48000	43200	43.99956	0.570963161
14								
15	alpha (deg)=	0.000001	muo=	0.9	muf=	0.4	Vf=	41
16								
17	s	Fy	Fx					
18	0.00001	0.00075399	0.4800048					
19	0.05	0.000793665	2526.315789					
20	0.1	0.000653248	3878.025728					
21	0.2	0.000373728	4336.399005					
22	0.25	0.000301	4349.768652					
23	0.3	0.000249679	4319.924273					
24	0.35	0.000211772	4268.154395					
25	0.4	0.000182757	4204.922755					
26	0.5	0.000141524	4064.341338					
27	0.6	0.000113875	3920.833071					
28	0.75	8.64386E-05	3717.124791					
29	0.99999	5.97917E-05	3425.778353					
30								

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	A	B	C	D	E	F	G	H
1	s	tan alpha	u	Fz	Cs	Calpha	V s	mu
2	0.00001	0.017455059	44	6000	48000	43200	0.768022708	0.890721049
3	0.05	0.017455059	44	6000	48000	43200	2.330205718	0.872375307
4	0.1	0.017455059	44	6000	48000	43200	4.466526468	0.848392259
5	0.2	0.017455059	44	6000	48000	43200	8.83345112	0.803089278
6	0.25	0.017455059	44	6000	48000	43200	11.02677916	0.782092324
7	0.3	0.017455059	44	6000	48000	43200	13.22232425	0.762169518
8	0.35	0.017455059	44	6000	48000	43200	15.41913936	0.743274881
9	0.4	0.017455059	44	6000	48000	43200	17.61674938	0.725359682
10	0.5	0.017455059	44	6000	48000	43200	22.0134018	0.69227521
11	0.6	0.017455059	44	6000	48000	43200	26.4111692	0.662547821
12	0.75	0.017455059	44	6000	48000	43200	33.00893604	0.623522504
13	0.99999	0.017455059	44	6000	48000	43200	44.0062625	0.570935215
14								
15	alpha (deg)=	1	muo=	0.9	muf=	0.4	V f=	41
16								
17	s	F y	Fx					
18	0.00001	754.0660759	0.4800048					
19	0.05	793.7458265	2525.099689					
20	0.1	646.6873378	3835.837094					
21	0.2	372.3941692	4320.230803					
22	0.25	300.277255	4338.763459					
23	0.3	249.2504282	4312.008808					
24	0.35	211.500228	4262.217313					
25	0.4	182.5760687	4200.322717					
26	0.5	141.4348964	4061.373459					
27	0.6	113.8270368	3918.780986					
28	0.75	86.41739409	3715.836623					
29	0.99999	59.78572494	3425.08893					
30								

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	A	B	C	D	E	F	G	H
1	s	tan alpha	u	Fz	Cs	Calpha	Vs	mu
2	0.00001	0.034920757	44	6000	48000	43200	1.536513371	0.881608798
3	0.05	0.034920757	44	6000	48000	43200	2.683444269	0.868323004
4	0.1	0.034920757	44	6000	48000	43200	4.660565754	0.846275183
5	0.2	0.034920757	44	6000	48000	43200	8.933133445	0.802110447
6	0.25	0.034920757	44	6000	48000	43200	11.10679401	0.781347367
7	0.3	0.034920757	44	6000	48000	43200	13.28912612	0.761579911
8	0.35	0.034920757	44	6000	48000	43200	15.47646191	0.74279528
9	0.4	0.034920757	44	6000	48000	43200	17.66694295	0.72496161
10	0.5	0.034920757	44	6000	48000	43200	22.05359094	0.691988856
11	0.6	0.034920757	44	6000	48000	43200	26.44467571	0.662333346
12	0.75	0.034920757	44	6000	48000	43200	33.03575144	0.62337636
13	0.99999	0.034920757	44	6000	48000	43200	44.0263802	0.570851361
14								
15	alpha (deg)=	2	muo=	0.9	muf=	0.4	Vf=	41
16								
17	s	Fy	Fx					
18	0.00001	1508.591788	0.4800048					
19	0.05	1582.123843	2465.907729					
20	0.1	1256.058184	3716.569853					
21	0.2	736.9412537	4272.677709					
22	0.25	596.2712129	4306.171142					
23	0.3	495.9511284	4288.473883					
24	0.35	421.3822191	4244.521153					
25	0.4	364.0741706	4186.589369					
26	0.5	282.339065	4052.495522					
27	0.6	227.3669271	3912.63583					
28	0.75	172.7079527	3711.975597					
29	0.99999	119.5356787	3423.021035					
30								

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	A	B	C	D	E	F	G	H
1	s	tan alpha	u	Fz	Cs	Calpha	V s	mu
2	0.00001	0.069926787	44	6000	48000	43200	3.076778653	0.86385162
3	0.05	0.069926787	44	6000	48000	43200	3.782402238	0.855936883
4	0.1	0.069926787	44	6000	48000	43200	5.36903778	0.838629879
5	0.2	0.069926787	44	6000	48000	43200	9.322369156	0.798311053
6	0.25	0.069926787	44	6000	48000	43200	11.42219623	0.778425017
7	0.3	0.069926787	44	6000	48000	43200	13.55383956	0.759252917
8	0.35	0.069926787	44	6000	48000	43200	15.70434866	0.740895236
9	0.4	0.069926787	44	6000	48000	43200	17.86691262	0.72338053
10	0.5	0.069926787	44	6000	48000	43200	22.21410738	0.690847944
11	0.6	0.069926787	44	6000	48000	43200	26.57868632	0.661477296
12	0.75	0.069926787	44	6000	48000	43200	33.14312246	0.622792146
13	0.99999	0.069926787	44	6000	48000	43200	44.10700451	0.570515721
14								
15	alpha (deg)=	4	muo=	0.9	muf=	0.4	V f =	41
16								
17	s	F y	Fx					
18	0.00001	2959.855362	0.455073218					
19	0.05	2805.46903	2104.112842					
20	0.1	2264.213875	3326.541275					
21	0.2	1415.401154	4095.560742					
22	0.25	1159.855188	4181.800632					
23	0.3	972.1698378	4197.382988					
24	0.35	830.1289985	4175.413693					
25	0.4	719.6809743	4132.636					
26	0.5	560.478845	4017.364287					
27	0.6	452.452494	3888.220337					
28	0.75	344.4046328	3696.583437					
29	0.99999	238.7852335	3414.755076					
30								

	A	B	C	D	E	F	G	H
1	s	tan alpha	u	Fz	Cs	Calpha	V s	mu
2	0.00001	1.74533E-08	66	6000	48000	43200	0.000660001	0.899991951
3	0.05	1.74533E-08	66	6000	48000	43200	3.3	0.861333078
4	0.1	1.74533E-08	66	6000	48000	43200	6.6	0.825656417
5	0.2	1.74533E-08	66	6000	48000	43200	13.2	0.762366771
6	0.25	1.74533E-08	66	6000	48000	43200	16.5	0.734343556
7	0.3	1.74533E-08	66	6000	48000	43200	19.8	0.708487483
8	0.35	1.74533E-08	66	6000	48000	43200	23.1	0.68463096
9	0.4	1.74533E-08	66	6000	48000	43200	26.4	0.662619354
10	0.5	1.74533E-08	66	6000	48000	43200	33	0.623571226
11	0.6	1.74533E-08	66	6000	48000	43200	39.6	0.590329054
12	0.75	1.74533E-08	66	6000	48000	43200	49.5	0.549499198
13	0.99999	1.74533E-08	66	6000	48000	43200	65.99934	0.499969796
14								
15	alpha (deg)=	0.000001	muo=	0.9	muf=	0.4	Vf=	41
16								
17	s	Fy	Fx					
18	0.00001	0.00075399	0.4800048					
19	0.05	0.000793665	2526.315789					
20	0.1	0.000641537	3803.555377					
21	0.2	0.000356908	4138.298307					
22	0.25	0.000284071	4102.727326					
23	0.3	0.000233113	4031.319799					
24	0.35	0.000195798	3944.570917					
25	0.4	0.000167486	3852.229257					
26	0.5	0.000127773	3668.519657					
27	0.6	0.000101624	3498.413278					
28	0.75	7.62366E-05	3278.12335					
29	0.99999	5.23572E-05	2999.818306					
30								

	A	B	C	D	E	F	G	H
1	s	tan alpha	u	Fz	Cs	Calpha	V s	mu
2	0.00001	0.017455059	66	6000	48000	43200	1.152034062	0.886146348
3	0.05	0.017455059	66	6000	48000	43200	3.495308577	0.859140687
4	0.1	0.017455059	66	6000	48000	43200	6.699789702	0.824621674
5	0.2	0.017455059	66	6000	48000	43200	13.25017668	0.76192357
6	0.25	0.017455059	66	6000	48000	43200	16.54016874	0.734016151
7	0.3	0.017455059	66	6000	48000	43200	19.83348638	0.708235632
8	0.35	0.017455059	66	6000	48000	43200	23.12870904	0.684431725
9	0.4	0.017455059	66	6000	48000	43200	26.42512407	0.662458475
10	0.5	0.017455059	66	6000	48000	43200	33.0201027	0.623461634
11	0.6	0.017455059	66	6000	48000	43200	39.6167538	0.590251296
12	0.75	0.017455059	66	6000	48000	43200	49.51340406	0.54945033
13	0.99999	0.017455059	66	6000	48000	43200	66.00939374	0.499945285
14								
15	alpha (deg)=	1	muo=	0.9	muf=	0.4	V f=	41
16								
17	s	F y	Fx					
18	0.00001	754.0660759	0.4800048					
19	0.05	793.7458265	2522.898612					
20	0.1	634.7938214	3760.463032					
21	0.2	355.5694675	4122.125277					
22	0.25	283.3512892	4091.807947					
23	0.3	232.6892928	4023.530583					
24	0.35	195.531484	3938.77779					
25	0.4	167.3107277	3847.779475					
26	0.5	127.687626	3665.699055					
27	0.6	101.5786256	3496.497337					
28	0.75	76.21706884	3276.951246					
29	0.99999	52.35198541	2999.214367					
30								

	A	B	C	D	E	F	G	H
1	s	tan alpha	u	Fz	Cs	Calpha	V s	mu
2	0.00001	0.034920757	66	6000	48000	43200	2.304770056	0.872668452
3	0.05	0.034920757	66	6000	48000	43200	4.025166404	0.853245222
4	0.1	0.034920757	66	6000	48000	43200	6.990848631	0.82161796
5	0.2	0.034920757	66	6000	48000	43200	13.39970017	0.76060607
6	0.25	0.034920757	66	6000	48000	43200	16.66019101	0.733039791
7	0.3	0.034920757	66	6000	48000	43200	19.93368919	0.707483232
8	0.35	0.034920757	66	6000	48000	43200	23.21469286	0.68383585
9	0.4	0.034920757	66	6000	48000	43200	26.50041442	0.661976951
10	0.5	0.034920757	66	6000	48000	43200	33.0803864	0.623133312
11	0.6	0.034920757	66	6000	48000	43200	39.66701356	0.59001822
12	0.75	0.034920757	66	6000	48000	43200	49.55362716	0.549303783
13	0.99999	0.034920757	66	6000	48000	43200	66.0395703	0.499871751
14								
15	alpha (deg)=	2	muo=	0.9	muf=	0.4	V f =	41
16								
17	s	F y	Fx					
18	0.00001	1508.591788	0.4800048					
19	0.05	1578.556925	2453.894446					
20	0.1	1231.284435	3638.754165					
21	0.2	703.2664116	4074.568316					
22	0.25	562.4384696	4059.475534					
23	0.3	462.8593215	4000.374622					
24	0.35	389.4760462	3921.513093					
25	0.4	333.5723056	3834.496369					
26	0.5	254.8665139	3657.262542					
27	0.6	202.8862033	3490.760368					
28	0.75	152.3172405	3273.438327					
29	0.99999	104.672625	2997.402952					
30								

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	A	B	C	D	E	F	G	H
1	s	tan alpha	u	Fz	Cs	Calpha	V s	mu
2	0.00001	0.069926787	66	6000	48000	43200	4.61516798	0.8467696
3	0.05	0.069926787	66	6000	48000	43200	5.673603356	0.835383621
4	0.1	0.069926787	66	6000	48000	43200	8.053556671	0.810830157
5	0.2	0.069926787	66	6000	48000	43200	13.98355373	0.75550731
6	0.25	0.069926787	66	6000	48000	43200	17.13329434	0.729218897
7	0.3	0.069926787	66	6000	48000	43200	20.33075933	0.704519742
8	0.35	0.069926787	66	6000	48000	43200	23.55652298	0.681479257
9	0.4	0.069926787	66	6000	48000	43200	26.80036893	0.660067331
10	0.5	0.069926787	66	6000	48000	43200	33.32116107	0.62182679
11	0.6	0.069926787	66	6000	48000	43200	39.86802949	0.589088874
12	0.75	0.069926787	66	6000	48000	43200	49.7146837	0.548718438
13	0.99999	0.069926787	66	6000	48000	43200	66.16050677	0.499577596
14								
15	alpha (deg)=	4	muo=	0.9	muf=	0.4	V f =	41
16								
17	s	F y	Fx					
18	0.00001	2944.420287	0.451620925					
19	0.05	2770.258492	2074.281025					
20	0.1	2209.006	3241.816053					
21	0.2	1347.906217	3897.577448					
22	0.25	1092.355588	3936.178078					
23	0.3	906.2319139	3910.802132					
24	0.35	766.5667278	3854.1253					
25	0.4	658.9069258	3782.336088					
26	0.5	505.709103	3623.890907					
27	0.6	403.6195973	3467.973948					
28	0.75	303.7027036	3259.437319					
29	0.99999	209.0945988	2990.163296					
30								

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	A	B	C	D	E	F	G	H
1	s	tan alpha	u	Fz	Cs	Calpha	Vs	mu
2	0.00001	1.7453E-08	88	6000	48000	43200	0.00088	0.89998927
3	0.05	1.7453E-08	88	6000	48000	43200	4.4	0.84912041
4	0.1	1.7453E-08	88	6000	48000	43200	8.8	0.80341829
5	0.2	1.7453E-08	88	6000	48000	43200	17.6	0.72549263
6	0.25	1.7453E-08	88	6000	48000	43200	22	0.69237076
7	0.3	1.7453E-08	88	6000	48000	43200	26.4	0.66261935
8	0.35	1.7453E-08	88	6000	48000	43200	30.8	0.63589542
9	0.4	1.7453E-08	88	6000	48000	43200	35.2	0.6118909
10	0.5	1.7453E-08	88	6000	48000	43200	44	0.57096133
11	0.6	1.7453E-08	88	6000	48000	43200	52.8	0.53793785
12	0.75	1.7453E-08	88	6000	48000	43200	66	0.49996819
13	0.99999	1.7453E-08	88	6000	48000	43200	87.99912	0.4584568
14								
15	alpha (deg)=	0.000001	muo=	0.9	muf=	0.4	Vf=	41
16								
17	s	Fy	Fx					
18	0.00001	0.00075399	0.4800048					
19	0.05	0.00079367	2526.31579					
20	0.1	0.0006301	3731.26062					
21	0.2	0.00034159	3958.20109					
22	0.25	0.0002691	3884.57486					
23	0.3	0.00021888	3783.62544					
24	0.35	0.00018246	3674.56757					
25	0.4	0.00015509	3566.04245					
26	0.5	0.00011721	3364.64355					
27	0.6	9.2719E-05	3191.45496					
28	0.75	6.9405E-05	2984.18611					
29	0.99999	4.801E-05	2750.74043					
30								

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	A	B	C	D	E	F	G	H
1	s	tan alpha	u	Fz	Cs	Calpha	Vs	mu
2	0.00001	0.01745506	88	6000	48000	43200	1.53604542	0.8816143
3	0.05	0.01745506	88	6000	48000	43200	4.66041144	0.84627686
4	0.1	0.01745506	88	6000	48000	43200	8.93305294	0.80211124
5	0.2	0.01745506	88	6000	48000	43200	17.6669022	0.72496193
6	0.25	0.01745506	88	6000	48000	43200	22.0535583	0.69198909
7	0.3	0.01745506	88	6000	48000	43200	26.4446485	0.66233352
8	0.35	0.01745506	88	6000	48000	43200	30.8382787	0.63567529
9	0.4	0.01745506	88	6000	48000	43200	35.2334988	0.61171785
10	0.5	0.01745506	88	6000	48000	43200	44.0268036	0.5708496
11	0.6	0.01745506	88	6000	48000	43200	52.8223384	0.53786272
12	0.75	0.01745506	88	6000	48000	43200	66.0178721	0.49992462
13	0.99999	0.01745506	88	6000	48000	43200	88.012525	0.4584377
14								
15	alpha (deg)=	1	muo=	0.9	muf=	0.4	Vf=	41
16								
17	s	Fy	Fx					
18	0.00001	754.066076	0.4800048					
19	0.05	793.745827	2519.69311					
20	0.1	623.199932	3687.3787					
21	0.2	340.254563	3942.10197					
22	0.25	268.390563	3873.8055					
23	0.3	218.465246	3776.01406					
24	0.35	182.199078	3668.95905					
25	0.4	154.918124	3561.77411					
26	0.5	117.130621	3361.98626					
27	0.6	92.6766296	3189.68008					
28	0.75	69.3870982	2983.12386					
29	0.99999	48.005501	2750.20684					
30								

	A	B	C	D	E	F	G	H
1	s	tan alpha	u	Fz	Cs	Calpha	Vs	mu
2	0.00001	0.03492076	88	6000	48000	43200	3.07302674	0.86389407
3	0.05	0.03492076	88	6000	48000	43200	5.36688854	0.83865287
4	0.1	0.03492076	88	6000	48000	43200	9.32113151	0.79832308
5	0.2	0.03492076	88	6000	48000	43200	17.8662669	0.72338562
6	0.25	0.03492076	88	6000	48000	43200	22.213588	0.69085163
7	0.3	0.03492076	88	6000	48000	43200	26.5782522	0.66148006
8	0.35	0.03492076	88	6000	48000	43200	30.9529238	0.63501721
9	0.4	0.03492076	88	6000	48000	43200	35.3338859	0.6112001
10	0.5	0.03492076	88	6000	48000	43200	44.1071819	0.57051498
11	0.6	0.03492076	88	6000	48000	43200	52.8893514	0.53763757
12	0.75	0.03492076	88	6000	48000	43200	66.0715029	0.499794
13	0.99999	0.03492076	88	6000	48000	43200	88.0527604	0.45838038
14								
15	alpha (deg)=	2	muo=	0.9	muf=	0.4	Vf=	41
16								
17	s	Fy	Fx					
18	0.00001	1508.59179	0.4800048					
19	0.05	1574.30034	2441.23122					
20	0.1	1207.22756	3563.55776					
21	0.2	672.653628	3894.77444					
22	0.25	532.564598	3841.92391					
23	0.3	434.461361	3753.39074					
24	0.35	362.856499	3652.24704					
25	0.4	308.825968	3549.03435					
26	0.5	233.77987	3354.03905					
27	0.6	185.101245	3184.3659					
28	0.75	138.668437	2979.94035					
29	0.99999	95.9843755	2748.60643					
30								

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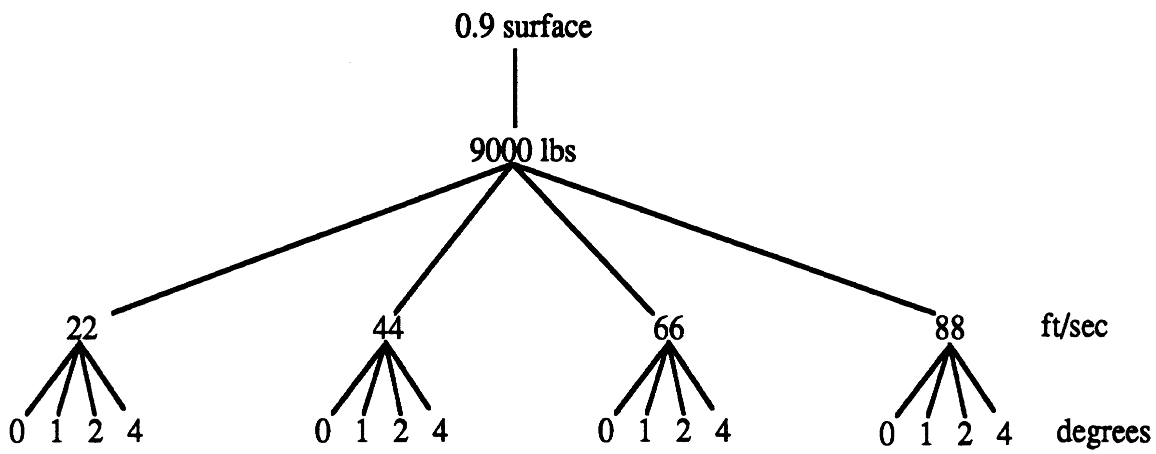
	A	B	C	D	E	F	G	H
1	s	tan alpha	u	Fz	Cs	Calpha	Vs	mu
2	0.00001	0.06992679	88	6000	48000	43200	6.15355731	0.83031665
3	0.05	0.06992679	88	6000	48000	43200	7.56480448	0.81575688
4	0.1	0.06992679	88	6000	48000	43200	10.7380756	0.78479234
5	0.2	0.06992679	88	6000	48000	43200	18.6447383	0.71730339
6	0.25	0.06992679	88	6000	48000	43200	22.8443925	0.68641099
7	0.3	0.06992679	88	6000	48000	43200	27.1076791	0.65812532
8	0.35	0.06992679	88	6000	48000	43200	31.4086973	0.63241912
9	0.4	0.06992679	88	6000	48000	43200	35.7338252	0.60914993
10	0.5	0.06992679	88	6000	48000	43200	44.4282148	0.56918505
11	0.6	0.06992679	88	6000	48000	43200	53.1573726	0.53674075
12	0.75	0.06992679	88	6000	48000	43200	66.2862449	0.49927268
13	0.99999	0.06992679	88	6000	48000	43200	88.214009	0.45815122
14								
15	alpha (deg)=	4	muo=	0.9	muf=	0.4	Vf=	41
16								
17	s	Fy	Fx					
18	0.00001	2927.90982	0.4480842					
19	0.05	2735.15831	2044.84357					
20	0.1	2156.06275	3160.87188					
21	0.2	1286.86101	3718.80178					
22	0.25	1032.99425	3720.43863					
23	0.3	849.835599	3665.93579					
24	0.35	713.687388	3587.05352					
25	0.4	609.723226	3499.03247					
26	0.5	463.75375	3322.61492					
27	0.6	368.201517	3163.26498					
28	0.75	276.494107	2967.25467					
29	0.99999	191.755892	2742.21061					
30								

Appendix C - Generic Truck Tire Data for a "0.9 Surface" - Fz = 9000 lbs



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	A	B	C	D	E	F	G	H
1	s	tan alpha	u	Fz	Cs	Calpha	Vs	mu
2	0.00001	1.7453E-08	22	9000	63000	56700	0.00022	0.89999732
3	0.05	1.7453E-08	22	9000	63000	56700	1.1	0.88676372
4	0.1	1.7453E-08	22	9000	63000	56700	2.2	0.87387784
5	0.2	1.7453E-08	22	9000	63000	56700	4.4	0.84912041
6	0.25	1.7453E-08	22	9000	63000	56700	5.5	0.83723104
7	0.3	1.7453E-08	22	9000	63000	56700	6.6	0.82565642
8	0.35	1.7453E-08	22	9000	63000	56700	7.7	0.8143882
9	0.4	1.7453E-08	22	9000	63000	56700	8.8	0.80341829
10	0.5	1.7453E-08	22	9000	63000	56700	11	0.78234197
11	0.6	1.7453E-08	22	9000	63000	56700	13.2	0.76236677
12	0.75	1.7453E-08	22	9000	63000	56700	16.5	0.73434356
13	0.99999	1.7453E-08	22	9000	63000	56700	21.99978	0.69237233
14								
15	alpha (deg)=	0.000001	muo=	0.9	muf=	0.4	Vf=	41
16								
17	s	Fy	Fx					
18	0.00001	0.00098961	0.6300063					
19	0.05	0.00104169	3315.78947					
20	0.1	0.00094427	5655.73409					
21	0.2	0.00057701	6715.07666					
22	0.25	0.00047362	6859.1577					
23	0.3	0.00039926	6919.62637					
24	0.35	0.00034356	6933.58722					
25	0.4	0.00030041	6919.55054					
26	0.5	0.00023815	6844.34449					
27	0.6	0.00019556	6736.75742					
28	0.75	0.00015231	6551.31409					
29	0.99999	0.00010876	6231.34944					
30								

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	A	B	C	D	E	F	G	H
1	s	tan alpha	u	Fz	Cs	Calpha	Vs	mu
2	0.00001	0.01745506	22	9000	63000	56700	0.38401135	0.8953388
3	0.05	0.01745506	22	9000	63000	56700	1.16510286	0.88599141
4	0.1	0.01745506	22	9000	63000	56700	2.23326323	0.87349354
5	0.2	0.01745506	22	9000	63000	56700	4.41672556	0.84893723
6	0.25	0.01745506	22	9000	63000	56700	5.51338958	0.83708828
7	0.3	0.01745506	22	9000	63000	56700	6.61116213	0.82554055
8	0.35	0.01745506	22	9000	63000	56700	7.70956968	0.81429149
9	0.4	0.01745506	22	9000	63000	56700	8.80837469	0.80333589
10	0.5	0.01745506	22	9000	63000	56700	11.0067009	0.78227949
11	0.6	0.01745506	22	9000	63000	56700	13.2055846	0.76231742
12	0.75	0.01745506	22	9000	63000	56700	16.504468	0.73430712
13	0.99999	0.01745506	22	9000	63000	56700	22.0031312	0.69234843
14								
15	alpha (deg)=	1	muo=	0.9	muf=	0.4	Vf=	41
16								
17	s	Fy	Fx					
18	0.00001	989.711725	0.6300063					
19	0.05	1041.7914	3315.78947					
20	0.1	936.357663	5602.38723					
21	0.2	575.11985	6691.89924					
22	0.25	472.56935	6843.08498					
23	0.3	398.633143	6907.90717					
24	0.35	343.157775	6924.69605					
25	0.4	300.143383	6912.59015					
26	0.5	238.015	6839.76671					
27	0.6	195.488178	6733.53322					
28	0.75	152.273707	6549.2341					
29	0.99999	108.749335	6230.18532					
30								

	A	B	C	D	E	F	G	H
1	s	tan alpha	u	Fz	Cs	Calpha	Vs	mu
2	0.00001	0.03492076	22	9000	63000	56700	0.76825669	0.89071825
3	0.05	0.03492076	22	9000	63000	56700	1.34172213	0.88390237
4	0.1	0.03492076	22	9000	63000	56700	2.33028288	0.87237442
5	0.2	0.03492076	22	9000	63000	56700	4.46656672	0.84839182
6	0.25	0.03492076	22	9000	63000	56700	5.553397	0.83666198
7	0.3	0.03492076	22	9000	63000	56700	6.64456306	0.82519402
8	0.35	0.03492076	22	9000	63000	56700	7.73823095	0.81400198
9	0.4	0.03492076	22	9000	63000	56700	8.83347147	0.80308908
10	0.5	0.03492076	22	9000	63000	56700	11.0267955	0.78209217
11	0.6	0.03492076	22	9000	63000	56700	13.2223379	0.7621694
12	0.75	0.03492076	22	9000	63000	56700	16.5178757	0.73419782
13	0.99999	0.03492076	22	9000	63000	56700	22.0131901	0.69227672
14								
15	alpha (deg)=	2	muo=	0.9	muf=	0.4	Vf=	41
16								
17	s	Fy	Fx					
18	0.00001	1980.02672	0.6300063					
19	0.05	2084.21781	3314.88318					
20	0.1	1827.08887	5450.13092					
21	0.2	1139.0995	6623.69277					
22	0.25	938.936157	6795.4708					
23	0.3	793.524023	6873.05575					
24	0.35	683.915656	6898.19087					
25	0.4	598.674279	6891.80743					
26	0.5	475.22488	6826.07171					
27	0.6	390.535877	6723.87728					
28	0.75	304.350507	6542.99934					
29	0.99999	217.443016	6226.69342					
30								

	A	B	C	D	E	F	G	H
1	s	tan alpha	u	Fz	Cs	Calpha	Vs	mu
2	0.00001	0.06992679	22	9000	63000	56700	1.53838933	0.88158676
3	0.05	0.06992679	22	9000	63000	56700	1.89120112	0.87746041
4	0.1	0.06992679	22	9000	63000	56700	2.68451889	0.86831073
5	0.2	0.06992679	22	9000	63000	56700	4.66118458	0.84626845
6	0.25	0.06992679	22	9000	63000	56700	5.71109811	0.83498564
7	0.3	0.06992679	22	9000	63000	56700	6.77691978	0.82382362
8	0.35	0.06992679	22	9000	63000	56700	7.85217433	0.81285302
9	0.4	0.06992679	22	9000	63000	56700	8.93345631	0.80210728
10	0.5	0.06992679	22	9000	63000	56700	11.1070537	0.78134495
11	0.6	0.06992679	22	9000	63000	56700	13.2893432	0.761578
12	0.75	0.06992679	22	9000	63000	56700	16.5715612	0.7337605
13	0.99999	0.06992679	22	9000	63000	56700	22.0535023	0.69198949
14								
15	alpha (deg)=	4	muo=	0.9	muf=	0.4	Vf=	41
16								
17	s	Fy	Fx					
18	0.00001	3964.88846	0.62377048					
19	0.05	3951.97869	3002.54789					
20	0.1	3340.21692	4939.49429					
21	0.2	2194.99559	6369.14773					
22	0.25	1830.48776	6613.58091					
23	0.3	1558.06753	6738.06619					
24	0.35	1349.08397	6794.62408					
25	0.4	1184.67813	6810.12155					
26	0.5	944.077875	6771.85902					
27	0.6	777.571513	6685.50131					
28	0.75	607.130809	6518.13798					
29	0.99999	434.440768	6212.7327					
30								

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	A	B	C	D	E	F	G	H
1	s	tan alpha	u	Fz	Cs	Calpha	Vs	mu
2	0.00001	1.7453E-08	44	9000	63000	56700	0.00044	0.89999463
3	0.05	1.7453E-08	44	9000	63000	56700	2.2	0.87387784
4	0.1	1.7453E-08	44	9000	63000	56700	4.4	0.84912041
5	0.2	1.7453E-08	44	9000	63000	56700	8.8	0.80341829
6	0.25	1.7453E-08	44	9000	63000	56700	11	0.78234197
7	0.3	1.7453E-08	44	9000	63000	56700	13.2	0.76236677
8	0.35	1.7453E-08	44	9000	63000	56700	15.4	0.74343516
9	0.4	1.7453E-08	44	9000	63000	56700	17.6	0.72549263
10	0.5	1.7453E-08	44	9000	63000	56700	22	0.69237076
11	0.6	1.7453E-08	44	9000	63000	56700	26.4	0.66261935
12	0.75	1.7453E-08	44	9000	63000	56700	33	0.62357123
13	0.99999	1.7453E-08	44	9000	63000	56700	43.99956	0.57096316
14								
15	alpha (deg)=	0.000001	muo=	0.9	muf=	0.4	Vf=	41
16								
17	s	Fy	Fx					
18	0.00001	0.00098961	0.6300063					
19	0.05	0.00104169	3315.78947					
20	0.1	0.00092931	5556.31786					
21	0.2	0.00055053	6400.8605					
22	0.25	0.00044578	6450.87801					
23	0.3	0.000371	6425.39862					
24	0.35	0.00031537	6360.9909					
25	0.4	0.0002726	6275.66278					
26	0.5	0.00021154	6077.25131					
27	0.6	0.00017043	5869.48895					
28	0.75	0.00012952	5570.47949					
29	0.99999	8.9688E-05	5138.6674					
30								

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	A	B	C	D	E	F	G	H
1	s	tan alpha	u	Fz	Cs	Calpha	Vs	mu
2	0.00001	0.01745506	44	9000	63000	56700	0.76802271	0.89072105
3	0.05	0.01745506	44	9000	63000	56700	2.33020572	0.87237531
4	0.1	0.01745506	44	9000	63000	56700	4.46652647	0.84839226
5	0.2	0.01745506	44	9000	63000	56700	8.83345112	0.80308928
6	0.25	0.01745506	44	9000	63000	56700	11.0267792	0.78209232
7	0.3	0.01745506	44	9000	63000	56700	13.2223243	0.76216952
8	0.35	0.01745506	44	9000	63000	56700	15.4191394	0.74327488
9	0.4	0.01745506	44	9000	63000	56700	17.6167494	0.72535968
10	0.5	0.01745506	44	9000	63000	56700	22.0134018	0.69227521
11	0.6	0.01745506	44	9000	63000	56700	26.4111692	0.66254782
12	0.75	0.01745506	44	9000	63000	56700	33.008936	0.6235225
13	0.99999	0.01745506	44	9000	63000	56700	44.0062625	0.57093521
14								
15	alpha (deg)=	1	muo=	0.9	muf=	0.4	Vf=	41
16								
17	s	Fy	Fx					
18	0.00001	989.711725	0.6300063					
19	0.05	1041.7914	3315.78947					
20	0.1	921.044696	5501.17741					
21	0.2	548.615735	6377.4767					
22	0.25	444.723965	6434.77497					
23	0.3	370.366797	6413.73736					
24	0.35	314.971729	6352.20533					
25	0.4	272.329538	6268.83461					
26	0.5	211.406356	6072.82825					
27	0.6	170.360805	5866.42331					
28	0.75	129.491518	5568.55087					
29	0.99999	89.6785849	5137.63326					
30								

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	A	B	C	D	E	F	G	H
1	s	tan alpha	u	Fz	Cs	Calpha	Vs	mu
2	0.00001	0.03492076	44	9000	63000	56700	1.53651337	0.8816088
3	0.05	0.03492076	44	9000	63000	56700	2.68344427	0.868323
4	0.1	0.03492076	44	9000	63000	56700	4.66056575	0.84627518
5	0.2	0.03492076	44	9000	63000	56700	8.93313344	0.80211045
6	0.25	0.03492076	44	9000	63000	56700	11.106794	0.78134737
7	0.3	0.03492076	44	9000	63000	56700	13.2891261	0.76157991
8	0.35	0.03492076	44	9000	63000	56700	15.4764619	0.74279528
9	0.4	0.03492076	44	9000	63000	56700	17.6669429	0.72496161
10	0.5	0.03492076	44	9000	63000	56700	22.0535909	0.69198886
11	0.6	0.03492076	44	9000	63000	56700	26.4446757	0.66233335
12	0.75	0.03492076	44	9000	63000	56700	33.0357514	0.62337636
13	0.99999	0.03492076	44	9000	63000	56700	44.0263802	0.57085136
14								
15	alpha (deg)=	2	muo=	0.9	muf=	0.4	Vf=	41
16								
17	s	Fy	Fx					
18	0.00001	1980.02672	0.6300063					
19	0.05	2084.21781	3311.98638					
20	0.1	1794.52411	5344.02689					
21	0.2	1085.94521	6308.67508					
22	0.25	883.204367	6387.07753					
23	0.3	736.988008	6379.06236					
24	0.35	627.554257	6326.01779					
25	0.4	543.061961	6248.4487					
26	0.5	422.022831	6059.59722					
27	0.6	340.293074	5857.24291					
28	0.75	258.793263	5562.77021					
29	0.99999	179.303513	5134.53142					
30								

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	A	B	C	D	E	F	G	H
1	s	tan alpha	u	Fz	Cs	Calpha	Vs	mu
2	0.00001	0.06992679	44	9000	63000	56700	3.07677865	0.86385162
3	0.05	0.06992679	44	9000	63000	56700	3.78240224	0.85593688
4	0.1	0.06992679	44	9000	63000	56700	5.36903778	0.83862988
5	0.2	0.06992679	44	9000	63000	56700	9.32236916	0.79831105
6	0.25	0.06992679	44	9000	63000	56700	11.4221962	0.77842502
7	0.3	0.06992679	44	9000	63000	56700	13.5538396	0.75925292
8	0.35	0.06992679	44	9000	63000	56700	15.7043487	0.74089524
9	0.4	0.06992679	44	9000	63000	56700	17.8669126	0.72338053
10	0.5	0.06992679	44	9000	63000	56700	22.2141074	0.69084794
11	0.6	0.06992679	44	9000	63000	56700	26.5786863	0.6614773
12	0.75	0.06992679	44	9000	63000	56700	33.1431225	0.62279215
13	0.99999	0.06992679	44	9000	63000	56700	44.1070045	0.57051572
14								
15	alpha (deg)=	4	muo=	0.9	muf=	0.4	Vf=	41
16								
17	s	Fy	Fx					
18	0.00001	3963.37141	0.62129277					
19	0.05	3914.18646	2966.96038					
20	0.1	3263.61463	4819.01104					
21	0.2	2087.64632	6052.07459					
22	0.25	1718.73063	6204.96247					
23	0.3	1444.97937	6244.8158					
24	0.35	1236.44994	6223.73335					
25	0.4	1073.57735	6168.35229					
26	0.5	837.795609	6007.23824					
27	0.6	677.181389	5820.76742					
28	0.75	516.073442	5539.72524					
29	0.99999	358.17784	5122.13248					
30								

	A	B	C	D	E	F	G	H
1	s	tan alpha	u	Fz	Cs	Calpha	Vs	mu
2	0.00001	1.7453E-08	66	9000	63000	56700	0.00066	0.89999195
3	0.05	1.7453E-08	66	9000	63000	56700	3.3	0.86133308
4	0.1	1.7453E-08	66	9000	63000	56700	6.6	0.82565642
5	0.2	1.7453E-08	66	9000	63000	56700	13.2	0.76236677
6	0.25	1.7453E-08	66	9000	63000	56700	16.5	0.73434356
7	0.3	1.7453E-08	66	9000	63000	56700	19.8	0.70848748
8	0.35	1.7453E-08	66	9000	63000	56700	23.1	0.68463096
9	0.4	1.7453E-08	66	9000	63000	56700	26.4	0.66261935
10	0.5	1.7453E-08	66	9000	63000	56700	33	0.62357123
11	0.6	1.7453E-08	66	9000	63000	56700	39.6	0.59032905
12	0.75	1.7453E-08	66	9000	63000	56700	49.5	0.5494992
13	0.99999	1.7453E-08	66	9000	63000	56700	65.99934	0.4999698
14								
15	alpha (deg)=	0.000001	muo=	0.9	muf=	0.4	Vf=	41
16								
17	s	Fy	Fx					
18	0.00001	0.00098961	0.6300063					
19	0.05	0.00104169	3315.78947					
20	0.1	0.0009145	5458.8224					
21	0.2	0.0005263	6114.03982					
22	0.25	0.00042106	6089.09085					
23	0.3	0.00034663	5999.92146					
24	0.35	0.00029176	5881.88177					
25	0.4	0.00024995	5751.88242					
26	0.5	0.00019105	5487.15641					
27	0.6	0.00015213	5238.28541					
28	0.75	0.00011425	4913.14106					
29	0.99999	7.8536E-05	4499.72736					
30								

	A	B	C	D	E	F	G	H
1	s	tan alpha	u	Fz	Cs	Calpha	Vs	mu
2	0.00001	0.01745506	66	9000	63000	56700	1.15203406	0.88614635
3	0.05	0.01745506	66	9000	63000	56700	3.49530858	0.85914069
4	0.1	0.01745506	66	9000	63000	56700	6.6997897	0.82462167
5	0.2	0.01745506	66	9000	63000	56700	13.2501767	0.76192357
6	0.25	0.01745506	66	9000	63000	56700	16.5401687	0.73401615
7	0.3	0.01745506	66	9000	63000	56700	19.8334864	0.70823563
8	0.35	0.01745506	66	9000	63000	56700	23.128709	0.68443173
9	0.4	0.01745506	66	9000	63000	56700	26.4251241	0.66245847
10	0.5	0.01745506	66	9000	63000	56700	33.0201027	0.62346163
11	0.6	0.01745506	66	9000	63000	56700	39.6167538	0.5902513
12	0.75	0.01745506	66	9000	63000	56700	49.5134041	0.54945033
13	0.99999	0.01745506	66	9000	63000	56700	66.0093937	0.49994528
14								
15	alpha (deg)=	1	muo=	0.9	muf=	0.4	Vf=	41
16								
17	s	Fy	Fx					
18	0.00001	989.711725	0.6300063					
19	0.05	1041.7914	3315.78947					
20	0.1	905.911001	5402.0717					
21	0.2	524.375146	6090.59413					
22	0.25	420.013286	6073.08477					
23	0.3	346.004121	5988.42975					
24	0.35	291.365115	5873.29915					
25	0.4	249.686134	5745.27086					
26	0.5	190.926385	5482.95001					
27	0.6	152.066543	5235.42185					
28	0.75	114.221104	4911.38581					
29	0.99999	78.5279762	4498.82145					
30								

	A	B	C	D	E	F	G	H
1	s	tan alpha	u	Fz	Cs	Calpha	Vs	mu
2	0.00001	0.03492076	66	9000	63000	56700	2.30477006	0.87266845
3	0.05	0.03492076	66	9000	63000	56700	4.0251664	0.85324522
4	0.1	0.03492076	66	9000	63000	56700	6.99084863	0.82161796
5	0.2	0.03492076	66	9000	63000	56700	13.3997002	0.76060607
6	0.25	0.03492076	66	9000	63000	56700	16.660191	0.73303979
7	0.3	0.03492076	66	9000	63000	56700	19.9336892	0.70748323
8	0.35	0.03492076	66	9000	63000	56700	23.2146929	0.68383585
9	0.4	0.03492076	66	9000	63000	56700	26.5004144	0.66197695
10	0.5	0.03492076	66	9000	63000	56700	33.0803864	0.62313331
11	0.6	0.03492076	66	9000	63000	56700	39.6670136	0.59001822
12	0.75	0.03492076	66	9000	63000	56700	49.5536272	0.54930378
13	0.99999	0.03492076	66	9000	63000	56700	66.0395703	0.49987175
14								
15	alpha (deg)=	2	muo=	0.9	muf=	0.4	Vf=	41
16								
17	s	Fy	Fx					
18	0.00001	1980.02672	0.6300063					
19	0.05	2084.21781	3307.2854					
20	0.1	1762.50651	5240.55829					
21	0.2	1037.39539	6021.62646					
22	0.25	833.797636	6025.68331					
23	0.3	688.301028	5954.26432					
24	0.35	580.383929	5847.72015					
25	0.4	497.815992	5725.53413					
26	0.5	381.094973	5470.3684					
27	0.6	303.728331	5226.84735					
28	0.75	228.26725	4906.12514					
29	0.99999	157.008934	4496.10433					
30								

	A	B	C	D	E	F	G	H
1	s	tan alpha	u	Fz	Cs	Calpha	Vs	mu
2	0.00001	0.06992679	66	9000	63000	56700	4.61516798	0.8467696
3	0.05	0.06992679	66	9000	63000	56700	5.67360336	0.83538362
4	0.1	0.06992679	66	9000	63000	56700	8.05355667	0.81083016
5	0.2	0.06992679	66	9000	63000	56700	13.9835537	0.75550731
6	0.25	0.06992679	66	9000	63000	56700	17.1332943	0.7292189
7	0.3	0.06992679	66	9000	63000	56700	20.3307593	0.70451974
8	0.35	0.06992679	66	9000	63000	56700	23.556523	0.68147926
9	0.4	0.06992679	66	9000	63000	56700	26.8003689	0.66006733
10	0.5	0.06992679	66	9000	63000	56700	33.3211611	0.62182679
11	0.6	0.06992679	66	9000	63000	56700	39.8680295	0.58908887
12	0.75	0.06992679	66	9000	63000	56700	49.7146837	0.54871844
13	0.99999	0.06992679	66	9000	63000	56700	66.1605068	0.4995776
14								
15	alpha (deg)=	4	muo=	0.9	muf=	0.4	Vf=	41
16								
17	s	Fy	Fx					
18	0.00001	3958.87387	0.61851535					
19	0.05	3875.32134	2931.19035					
20	0.1	3189.45514	4703.05927					
21	0.2	1990.10407	5764.6243					
22	0.25	1620.05862	5844.82179					
23	0.3	1347.91749	5822.06844					
24	0.35	1142.45268	5747.86475					
25	0.4	983.41125	5648.02477					
26	0.5	756.195816	5420.59861					
27	0.6	604.241836	5192.79015					
28	0.75	455.13991	4885.15825					
29	0.99999	313.64189	4485.24484					
30								

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	A	B	C	D	E	F	G	H
1	s	tan alpha	u	Fz	Cs	Calpha	Vs	mu
2	0.00001	1.7453E-08	88	9000	63000	56700	0.00088	0.89998927
3	0.05	1.7453E-08	88	9000	63000	56700	4.4	0.84912041
4	0.1	1.7453E-08	88	9000	63000	56700	8.8	0.80341829
5	0.2	1.7453E-08	88	9000	63000	56700	17.6	0.72549263
6	0.25	1.7453E-08	88	9000	63000	56700	22	0.69237076
7	0.3	1.7453E-08	88	9000	63000	56700	26.4	0.66261935
8	0.35	1.7453E-08	88	9000	63000	56700	30.8	0.63589542
9	0.4	1.7453E-08	88	9000	63000	56700	35.2	0.6118909
10	0.5	1.7453E-08	88	9000	63000	56700	44	0.57096133
11	0.6	1.7453E-08	88	9000	63000	56700	52.8	0.53793785
12	0.75	1.7453E-08	88	9000	63000	56700	66	0.49996819
13	0.99999	1.7453E-08	88	9000	63000	56700	87.99912	0.4584568
14								
15	alpha (deg)=	0.000001	muo=	0.9	muf=	0.4	Vf=	41
16								
17	s	Fy	Fx					
18	0.00001	0.00098961	0.6300063					
19	0.05	0.00104169	3315.78947					
20	0.1	0.00089989	5363.48042					
21	0.2	0.00050418	5852.71135					
22	0.25	0.00039917	5769.08021					
23	0.3	0.00032566	5634.27588					
24	0.35	0.00027201	5481.67886					
25	0.4	0.00023154	5326.49875					
26	0.5	0.00017531	5033.86724					
27	0.6	0.00013883	4779.43126					
28	0.75	0.00010402	4472.93137					
29	0.99999	7.2015E-05	4126.11057					
30								

	A	B	C	D	E	F	G	H
1	s	tan alpha	u	Fz	Cs	Calpha	Vs	mu
2	0.00001	0.01745506	88	9000	63000	56700	1.53604542	0.8816143
3	0.05	0.01745506	88	9000	63000	56700	4.66041144	0.84627686
4	0.1	0.01745506	88	9000	63000	56700	8.93305294	0.80211124
5	0.2	0.01745506	88	9000	63000	56700	17.6669022	0.72496193
6	0.25	0.01745506	88	9000	63000	56700	22.0535583	0.69198909
7	0.3	0.01745506	88	9000	63000	56700	26.4446485	0.66233352
8	0.35	0.01745506	88	9000	63000	56700	30.8382787	0.63567529
9	0.4	0.01745506	88	9000	63000	56700	35.2334988	0.61171785
10	0.5	0.01745506	88	9000	63000	56700	44.0268036	0.5708496
11	0.6	0.01745506	88	9000	63000	56700	52.8223384	0.53786272
12	0.75	0.01745506	88	9000	63000	56700	66.0178721	0.49992462
13	0.99999	0.01745506	88	9000	63000	56700	88.012525	0.4584377
14								
15	alpha (deg)=	1	muo=	0.9	muf=	0.4	Vf=	41
16								
17	s	Fy	Fx					
18	0.00001	989.711725	0.6300063					
19	0.05	1041.7914	3315.78947					
20	0.1	891.012359	5305.2952					
21	0.2	502.252824	5829.3249					
22	0.25	398.129886	5753.26986					
23	0.3	325.04806	5623.03306					
24	0.35	271.631974	5473.36177					
25	0.4	231.285795	5320.15188					
26	0.5	175.188686	5029.90237					
27	0.6	138.764676	4776.77766					
28	0.75	103.994138	4471.3404					
29	0.99999	72.0082499	4125.31017					
30								

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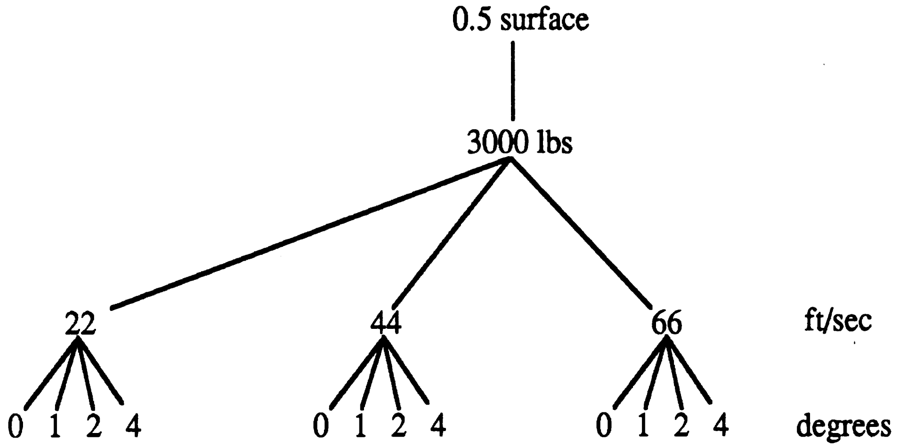
	A	B	C	D	E	F	G	H
1	s	tan alpha	u	Fz	Cs	Calpha	Vs	mu
2	0.00001	0.03492076	88	9000	63000	56700	3.07302674	0.86389407
3	0.05	0.03492076	88	9000	63000	56700	5.36688854	0.83865287
4	0.1	0.03492076	88	9000	63000	56700	9.32113151	0.79832308
5	0.2	0.03492076	88	9000	63000	56700	17.8662669	0.72338562
6	0.25	0.03492076	88	9000	63000	56700	22.213588	0.69085163
7	0.3	0.03492076	88	9000	63000	56700	26.5782522	0.66148006
8	0.35	0.03492076	88	9000	63000	56700	30.9529238	0.63501721
9	0.4	0.03492076	88	9000	63000	56700	35.3338859	0.6112001
10	0.5	0.03492076	88	9000	63000	56700	44.1071819	0.57051498
11	0.6	0.03492076	88	9000	63000	56700	52.8893514	0.53763757
12	0.75	0.03492076	88	9000	63000	56700	66.0715029	0.499794
13	0.99999	0.03492076	88	9000	63000	56700	88.0527604	0.45838038
14								
15	alpha (deg)=	2	muo=	0.9	muf=	0.4	Vf=	41
16								
17	s	Fy	Fx					
18	0.00001	1980.02672	0.6300063					
19	0.05	2084.21781	3300.95855					
20	0.1	1731.14038	5139.92624					
21	0.2	993.147447	5760.55005					
22	0.25	790.089109	5706.45805					
23	0.3	646.457488	5589.61363					
24	0.35	540.98195	5448.57793					
25	0.4	461.071566	5301.20782					
26	0.5	349.659886	5018.04444					
27	0.6	277.152864	4768.83247					
28	0.75	207.829954	4466.57231					
29	0.99999	143.97656	4122.90956					
30								

	A	B	C	D	E	F	G	H
1	s	tan alpha	u	Fz	Cs	Calpha	Vs	mu
2	0.00001	0.06992679	88	9000	63000	56700	6.15355731	0.83031665
3	0.05	0.06992679	88	9000	63000	56700	7.56480448	0.81575688
4	0.1	0.06992679	88	9000	63000	56700	10.7380756	0.78479234
5	0.2	0.06992679	88	9000	63000	56700	18.6447383	0.71730339
6	0.25	0.06992679	88	9000	63000	56700	22.8443925	0.68641099
7	0.3	0.06992679	88	9000	63000	56700	27.1076791	0.65812532
8	0.35	0.06992679	88	9000	63000	56700	31.4086973	0.63241912
9	0.4	0.06992679	88	9000	63000	56700	35.7338252	0.60914993
10	0.5	0.06992679	88	9000	63000	56700	44.4282148	0.56918505
11	0.6	0.06992679	88	9000	63000	56700	53.1573726	0.53674075
12	0.75	0.06992679	88	9000	63000	56700	66.2862449	0.49927268
13	0.99999	0.06992679	88	9000	63000	56700	88.214009	0.45815122
14								
15	alpha (deg)=	4	muo=	0.9	muf=	0.4	Vf=	41
16								
17	s	Fy	Fx					
18	0.00001	3951.72401	0.61547753					
19	0.05	3835.67639	2895.40348					
20	0.1	3117.8797	4591.73284					
21	0.2	1901.66661	5504.5187					
22	0.25	1533.12202	5527.98709					
23	0.3	1264.77889	5460.39031					
24	0.35	1064.16042	5351.88229					
25	0.4	910.369801	5226.84867					
26	0.5	693.646723	4971.15537					
27	0.6	551.316397	4737.28416					
28	0.75	414.398291	4447.5723					
29	0.99999	287.633831	4113.31584					
30								

APPENDIX D

GENERIC TRUCK TIRE DATA FOR A "0.5 SURFACE"

The first set of data is for Fz = 3000 lbs per the following chart. There is a similar set of data for Fz = 6000 lbs.



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	A	B	C	D	E	F	G	H
1	s	tan alpha	u	Fz	Cs	Calpha	Vs	mu
2	0.00001	1.7453E-08	22	3000	27000	24300	0.00022	0.49999822
3	0.05	1.7453E-08	22	3000	27000	24300	1.1	0.49121236
4	0.1	1.7453E-08	22	3000	27000	24300	2.2	0.48268212
5	0.2	1.7453E-08	22	3000	27000	24300	4.4	0.46636394
6	0.25	1.7453E-08	22	3000	27000	24300	5.5	0.45856156
7	0.3	1.7453E-08	22	3000	27000	24300	6.6	0.45098774
8	0.35	1.7453E-08	22	3000	27000	24300	7.7	0.44363577
9	0.4	1.7453E-08	22	3000	27000	24300	8.8	0.43649916
10	0.5	1.7453E-08	22	3000	27000	24300	11	0.42284694
11	0.6	1.7453E-08	22	3000	27000	24300	13.2	0.40998282
12	0.75	1.7453E-08	22	3000	27000	24300	16.5	0.39206551
13	0.99999	1.7453E-08	22	3000	27000	24300	21.99978	0.36553685
14								
15	alpha (deg)=	0.000001	muo=	0.5	muf=	0.2	Vf=	37
16								
17	s	Fy	Fx					
18	0.00001	0.00042412	0.2700027					
19	0.05	0.00036622	1091.59523					
20	0.1	0.00021885	1273.30984					
21	0.2	0.00011506	1326.59337					
22	0.25	9.1963E-05	1323.11502					
23	0.3	7.6156E-05	1313.41518					
24	0.35	6.468E-05	1300.4482					
25	0.4	5.5983E-05	1285.68103					
26	0.5	4.3703E-05	1253.64086					
27	0.6	3.5476E-05	1220.61035					
28	0.75	2.7261E-05	1171.92667					
29	0.99999	1.914E-05	1096.61044					
30								

.5 - 3000 - 22 - 1

	A	B	C	D	E	F	G	H
1	s	tan alpha	u	Fz	Cs	Calpha	Vs	mu
2	0.00001	0.01745506	22	3000	27000	24300	0.38401135	0.4969025
3	0.05	0.01745506	22	3000	27000	24300	1.16510286	0.49070041
4	0.1	0.01745506	22	3000	27000	24300	2.23326323	0.4824281
5	0.2	0.01745506	22	3000	27000	24300	4.41672556	0.46624356
6	0.25	0.01745506	22	3000	27000	24300	5.51338958	0.45846801
7	0.3	0.01745506	22	3000	27000	24300	6.61116213	0.45091203
8	0.35	0.01745506	22	3000	27000	24300	7.70956968	0.44357276
9	0.4	0.01745506	22	3000	27000	24300	8.80837469	0.43644563
10	0.5	0.01745506	22	3000	27000	24300	11.0067009	0.42280659
11	0.6	0.01745506	22	3000	27000	24300	13.2055846	0.40995113
12	0.75	0.01745506	22	3000	27000	24300	16.504468	0.39204232
13	0.99999	0.01745506	22	3000	27000	24300	22.0031312	0.36552186
14								
15	alpha (deg)=	1	muo=	0.5	muf=	0.2	Vf=	37
16								
17	s	Fy	Fx					
18	0.00001	424.162168	0.2700027					
19	0.05	353.379391	1050.01387					
20	0.1	216.008944	1256.33615					
21	0.2	114.638737	1321.5206					
22	0.25	91.7410038	1319.77048					
23	0.3	76.0268384	1311.05079					
24	0.35	64.599507	1298.6916					
25	0.4	55.9297646	1284.32668					
26	0.5	43.6765834	1252.76856					
27	0.6	35.4619296	1220.00452					
28	0.75	27.2547335	1171.54151					
29	0.99999	19.1378903	1096.39844					
30								

.5 - 3000 - 22 - 2

	A	B	C	D	E	F	G	H
1	s	tan alpha	u	Fz	Cs	Calpha	Vs	mu
2	0.00001	0.03492076	22	3000	27000	24300	0.76825669	0.49383512
3	0.05	0.03492076	22	3000	27000	24300	1.34172213	0.48931606
4	0.1	0.03492076	22	3000	27000	24300	2.33028288	0.4816885
5	0.2	0.03492076	22	3000	27000	24300	4.46656672	0.46588515
6	0.25	0.03492076	22	3000	27000	24300	5.553397	0.45818869
7	0.3	0.03492076	22	3000	27000	24300	6.64456306	0.45068563
8	0.35	0.03492076	22	3000	27000	24300	7.73823095	0.44338416
9	0.4	0.03492076	22	3000	27000	24300	8.83347147	0.43628531
10	0.5	0.03492076	22	3000	27000	24300	11.0267955	0.42268561
11	0.6	0.03492076	22	3000	27000	24300	13.2223379	0.40985609
12	0.75	0.03492076	22	3000	27000	24300	16.5178757	0.39197274
13	0.99999	0.03492076	22	3000	27000	24300	22.0131901	0.36547686
14								
15	alpha (deg)=	2	muo=	0.5	muf=	0.2	Vf=	37
16								
17	s	Fy	Fx					
18	0.00001	834.88079	0.25759557					
19	0.05	642.797838	948.678312					
20	0.1	416.23327	1209.17029					
21	0.2	226.778099	1306.61651					
22	0.25	182.167563	1309.86956					
23	0.3	151.287462	1304.02197					
24	0.35	128.718803	1293.45614					
25	0.4	111.542104	1280.28331					
26	0.5	87.1980272	1250.1591					
27	0.6	70.8400596	1218.19019					
28	0.75	54.4723696	1170.38703					
29	0.99999	38.26524	1095.76255					
30								

.5 - 3000 - 22 - 4

	A	B	C	D	E	F	G	H
1	s	tan alpha	u	Fz	Cs	Calpha	Vs	mu
2	0.00001	0.06992679	22	3000	27000	24300	1.53838933	0.48778233
3	0.05	0.06992679	22	3000	27000	24300	1.89120112	0.48505123
4	0.1	0.06992679	22	3000	27000	24300	2.68451889	0.4790045
5	0.2	0.06992679	22	3000	27000	24300	4.66118458	0.46449028
6	0.25	0.06992679	22	3000	27000	24300	5.71109811	0.45709058
7	0.3	0.06992679	22	3000	27000	24300	6.77691978	0.44979048
8	0.35	0.06992679	22	3000	27000	24300	7.85217433	0.4426358
9	0.4	0.06992679	22	3000	27000	24300	8.93345631	0.43564766
10	0.5	0.06992679	22	3000	27000	24300	11.1070537	0.4222031
11	0.6	0.06992679	22	3000	27000	24300	13.2893432	0.40947639
12	0.75	0.06992679	22	3000	27000	24300	16.5715612	0.3916944
13	0.99999	0.06992679	22	3000	27000	24300	22.0535023	0.36529667
14								
15	alpha (deg)=	4	muo=	0.5	muf=	0.2	Vf=	37
16								
17	s	Fy	Fx					
18	0.00001	1148.29627	0.16871951					
19	0.05	987.85422	720.351733					
20	0.1	733.699005	1062.08018					
21	0.2	435.00948	1251.30589					
22	0.25	354.321881	1272.14275					
23	0.3	296.649838	1276.83324					
24	0.35	253.689355	1273.01462					
25	0.4	220.591174	1264.39854					
26	0.5	173.168481	1239.83162					
27	0.6	141.014263	1210.98032					
28	0.75	108.648914	1165.78376					
29	0.99999	76.446148	1093.22032					
30								

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	A	B	C	D	E	F	G	H
1	s	tan alpha	u	Fz	Cs	Calpha	Vs	mu
2	0.00001	1.7453E-08	44	3000	27000	24300	0.00044	0.49999643
3	0.05	1.7453E-08	44	3000	27000	24300	2.2	0.48268212
4	0.1	1.7453E-08	44	3000	27000	24300	4.4	0.46636394
5	0.2	1.7453E-08	44	3000	27000	24300	8.8	0.43649916
6	0.25	1.7453E-08	44	3000	27000	24300	11	0.42284694
7	0.3	1.7453E-08	44	3000	27000	24300	13.2	0.40998282
8	0.35	1.7453E-08	44	3000	27000	24300	15.4	0.3978613
9	0.4	1.7453E-08	44	3000	27000	24300	17.6	0.3864395
10	0.5	1.7453E-08	44	3000	27000	24300	22	0.36553587
11	0.6	1.7453E-08	44	3000	27000	24300	26.4	0.34697595
12	0.75	1.7453E-08	44	3000	27000	24300	33	0.32296387
13	0.99999	1.7453E-08	44	3000	27000	24300	43.99956	0.2913415
14								
15	alpha (deg)=	0.000001	muo=	0.5	muf=	0.2	Vf=	37
16								
17	s	Fy	Fx					
18	0.00001	0.00042412	0.2700027					
19	0.05	0.00036239	1079.15815					
20	0.1	0.00021255	1235.97032					
21	0.2	0.00010812	1245.98696					
22	0.25	8.5093E-05	1223.84094					
23	0.3	6.9443E-05	1197.26509					
24	0.35	5.8163E-05	1169.08607					
25	0.4	4.968E-05	1140.65157					
26	0.5	3.7847E-05	1085.47289					
27	0.6	3.0063E-05	1034.23939					
28	0.75	2.2472E-05	965.994234					
29	0.99999	1.5255E-05	874.024415					
30								

.5 - 3000 - 44 - 1

	A	B	C	D	E	F	G	H
1	s	tan alpha	u	Fz	Cs	Calpha	Vs	mu
2	0.00001	0.01745506	44	3000	27000	24300	0.76802271	0.49383697
3	0.05	0.01745506	44	3000	27000	24300	2.33020572	0.48168909
4	0.1	0.01745506	44	3000	27000	24300	4.46652647	0.46588544
5	0.2	0.01745506	44	3000	27000	24300	8.83345112	0.43628544
6	0.25	0.01745506	44	3000	27000	24300	11.0267792	0.42268571
7	0.3	0.01745506	44	3000	27000	24300	13.2223243	0.40985616
8	0.35	0.01745506	44	3000	27000	24300	15.4191394	0.39775897
9	0.4	0.01745506	44	3000	27000	24300	17.6167494	0.38635512
10	0.5	0.01745506	44	3000	27000	24300	22.0134018	0.36547592
11	0.6	0.01745506	44	3000	27000	24300	26.4111692	0.34693159
12	0.75	0.01745506	44	3000	27000	24300	33.008936	0.32293418
13	0.99999	0.01745506	44	3000	27000	24300	44.0062625	0.29132495
14								
15	alpha (deg)=	1	muo=	0.5	muf=	0.2	Vf=	37
16								
17	s	Fy	Fx					
18	0.00001	424.162168	0.2700027					
19	0.05	349.266118	1036.85731					
20	0.1	209.689811	1218.86519					
21	0.2	107.692007	1240.93115					
22	0.25	84.8727567	1220.52847					
23	0.3	69.3153495	1194.93954					
24	0.35	58.0833252	1167.37126					
25	0.4	49.6278209	1139.34005					
26	0.5	37.8218816	1084.64274					
27	0.6	30.0497904	1033.67352					
28	0.75	22.4663661	965.644983					
29	0.99999	15.25311	873.841667					
30								

.5 - 3000 - 44 - 2

	A	B	C	D	E	F	G	H
1	s	tan alpha	u	Fz	Cs	Calpha	Vs	mu
2	0.00001	0.03492076	44	3000	27000	24300	1.53651337	0.48779692
3	0.05	0.03492076	44	3000	27000	24300	2.68344427	0.4790126
4	0.1	0.03492076	44	3000	27000	24300	4.66056575	0.46449471
5	0.2	0.03492076	44	3000	27000	24300	8.93313344	0.43564971
6	0.25	0.03492076	44	3000	27000	24300	11.106794	0.42220466
7	0.3	0.03492076	44	3000	27000	24300	13.2891261	0.40947762
8	0.35	0.03492076	44	3000	27000	24300	15.4764619	0.39745283
9	0.4	0.03492076	44	3000	27000	24300	17.6669429	0.38610249
10	0.5	0.03492076	44	3000	27000	24300	22.0535909	0.36529628
11	0.6	0.03492076	44	3000	27000	24300	26.4446757	0.34679859
12	0.75	0.03492076	44	3000	27000	24300	33.0357514	0.32284511
13	0.99999	0.03492076	44	3000	27000	24300	44.0263802	0.29127531
14								
15	alpha (deg)=	2	muo=	0.5	muf=	0.2	Vf=	37
16								
17	s	Fy	Fx					
18	0.00001	832.482279	0.25645868					
19	0.05	633.338534	933.954591					
20	0.1	403.44738	1171.34793					
21	0.2	212.887059	1226.07931					
22	0.25	168.439168	1210.72391					
23	0.3	137.873317	1188.02711					
24	0.35	115.694605	1162.26103					
25	0.4	98.9453614	1135.425					
26	0.5	75.4937931	1082.15965					
27	0.6	60.01942	1031.97905					
28	0.75	44.8977199	964.598203					
29	0.99999	30.496376	873.293533					
30								

.5 - 3000 - 44 - 4

	A	B	C	D	E	F	G	H
1	s	tan alpha	u	Fz	Cs	Calpha	Vs	mu
2	0.00001	0.06992679	44	3000	27000	24300	3.07677865	0.47606223
3	0.05	0.06992679	44	3000	27000	24300	3.78240224	0.47084735
4	0.1	0.06992679	44	3000	27000	24300	5.36903778	0.45947837
5	0.2	0.06992679	44	3000	27000	24300	9.32236916	0.4331837
6	0.25	0.06992679	44	3000	27000	24300	11.4221962	0.42031855
7	0.3	0.06992679	44	3000	27000	24300	13.5538396	0.40798428
8	0.35	0.06992679	44	3000	27000	24300	15.7043487	0.39624044
9	0.4	0.06992679	44	3000	27000	24300	17.8669126	0.38509939
10	0.5	0.06992679	44	3000	27000	24300	22.2141074	0.36458073
11	0.6	0.06992679	44	3000	27000	24300	26.5786863	0.34626786
12	0.75	0.06992679	44	3000	27000	24300	33.1431225	0.32248914
13	0.99999	0.06992679	44	3000	27000	24300	44.1070045	0.29107663
14								
15	alpha (deg)=	4	muo=	0.5	muf=	0.2	Vf=	37
16								
17	s	Fy	Fx					
18	0.00001	1128.09373	0.16561651					
19	0.05	964.493363	702.839848					
20	0.1	707.301717	1023.30469					
21	0.2	407.25474	1170.99613					
22	0.25	326.931131	1173.38502					
23	0.3	269.89211	1161.30237					
24	0.35	227.705964	1142.31807					
25	0.4	195.45457	1120.0513					
26	0.5	149.801231	1072.33621					
27	0.6	119.402046	1025.24786					
28	0.75	89.5163018	960.425631					
29	0.99999	60.9140175	871.102643					
30								

.5 - 3000 - 66 - 0

	A	B	C	D	E	F	G	H
1	s	tan alpha	u	Fz	Cs	Calpha	Vs	mu
2	0.00001	1.7453E-08	66	3000	27000	24300	0.00066	0.49999465
3	0.05	1.7453E-08	66	3000	27000	24300	3.3	0.47440175
4	0.1	1.7453E-08	66	3000	27000	24300	6.6	0.45098774
5	0.2	1.7453E-08	66	3000	27000	24300	13.2	0.40998282
6	0.25	1.7453E-08	66	3000	27000	24300	16.5	0.39206551
7	0.3	1.7453E-08	66	3000	27000	24300	19.8	0.37567705
8	0.35	1.7453E-08	66	3000	27000	24300	23.1	0.36068696
9	0.4	1.7453E-08	66	3000	27000	24300	26.4	0.34697595
10	0.5	1.7453E-08	66	3000	27000	24300	33	0.32296387
11	0.6	1.7453E-08	66	3000	27000	24300	39.6	0.30287475
12	0.75	1.7453E-08	66	3000	27000	24300	49.5	0.27872373
13	0.99999	1.7453E-08	66	3000	27000	24300	65.99934	0.25040128
14								
15	alpha (deg)=	0.000001	muo=	0.5	muf=	0.2	Vf=	37
16								
17	s	Fy	Fx					
18	0.00001	0.00042412	0.2700027					
19	0.05	0.00035859	1066.86497					
20	0.1	0.00020655	1200.42077					
21	0.2	0.0001019	1173.91982					
22	0.25	7.9133E-05	1137.7677					
23	0.3	6.3794E-05	1099.58856					
24	0.35	5.2843E-05	1061.92713					
25	0.4	4.4689E-05	1025.87881					
26	0.5	3.3484E-05	960.199475					
27	0.6	2.6266E-05	903.527958					
28	0.75	1.9403E-05	834.013221					
29	0.99999	1.3111E-05	751.203781					
30								

.5 - 3000 - 66 - 1

	A	B	C	D	E	F	G	H
1	s	tan alpha	u	Fz	Cs	Calpha	Vs	mu
2	0.00001	0.01745506	66	3000	27000	24300	1.15203406	0.4908031
3	0.05	0.01745506	66	3000	27000	24300	3.49530858	0.47295711
4	0.1	0.01745506	66	3000	27000	24300	6.6997897	0.45031173
5	0.2	0.01745506	66	3000	27000	24300	13.2501767	0.40969825
6	0.25	0.01745506	66	3000	27000	24300	16.5401687	0.39185711
7	0.3	0.01745506	66	3000	27000	24300	19.8334864	0.37551812
8	0.35	0.01745506	66	3000	27000	24300	23.128709	0.36056233
9	0.4	0.01745506	66	3000	27000	24300	26.4251241	0.34687618
10	0.5	0.01745506	66	3000	27000	24300	33.0201027	0.32289708
11	0.6	0.01745506	66	3000	27000	24300	39.6167538	0.30282818
12	0.75	0.01745506	66	3000	27000	24300	49.5134041	0.27869522
13	0.99999	0.01745506	66	3000	27000	24300	66.0093937	0.25038758
14								
15	alpha (deg)=	1	muo=	0.5	muf=	0.2	Vf=	37
16								
17	s	Fy	Fx					
18	0.00001	424.162168	0.2700027					
19	0.05	345.195534	1023.88992					
20	0.1	203.670204	1183.22499					
21	0.2	101.478704	1168.9124					
22	0.25	78.9157155	1134.51462					
23	0.3	63.6696046	1097.32547					
24	0.35	52.7663632	1060.27439					
25	0.4	44.6395399	1024.62735					
26	0.5	33.4599272	959.423535					
27	0.6	26.2536977	903.009923					
28	0.75	19.3975356	833.702946					
29	0.99999	13.109723	751.048293					
30								

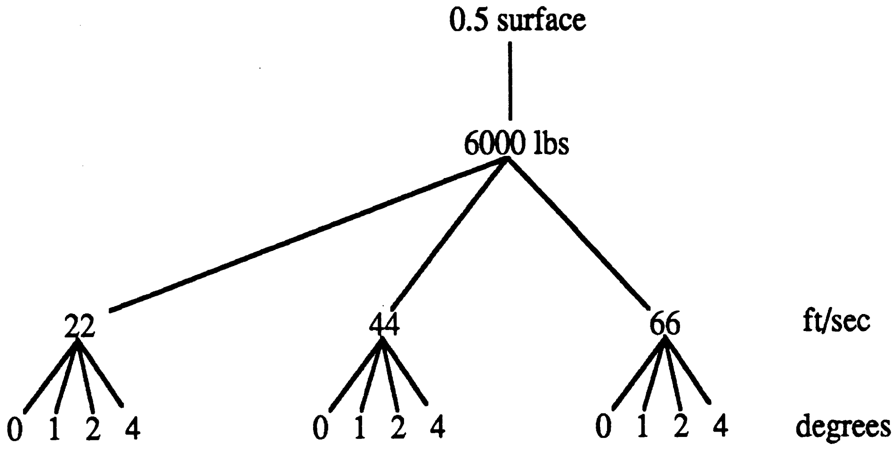
.5 - 3000 - 66 - 2

	A	B	C	D	E	F	G	H
1	s	tan alpha	u	Fz	Cs	Calpha	Vs	mu
2	0.00001	0.03492076	66	3000	27000	24300	2.30477006	0.4818828
3	0.05	0.03492076	66	3000	27000	24300	4.0251664	0.46907609
4	0.1	0.03492076	66	3000	27000	24300	6.99084863	0.44835039
5	0.2	0.03492076	66	3000	27000	24300	13.3997002	0.40885253
6	0.25	0.03492076	66	3000	27000	24300	16.660191	0.39123577
7	0.3	0.03492076	66	3000	27000	24300	19.9336892	0.37504343
8	0.35	0.03492076	66	3000	27000	24300	23.2146929	0.36018964
9	0.4	0.03492076	66	3000	27000	24300	26.5004144	0.34657761
10	0.5	0.03492076	66	3000	27000	24300	33.0803864	0.32269701
11	0.6	0.03492076	66	3000	27000	24300	39.6670136	0.30268859
12	0.75	0.03492076	66	3000	27000	24300	49.5536272	0.27860971
13	0.99999	0.03492076	66	3000	27000	24300	66.0395703	0.25034651
14								
15	alpha (deg)=	2	muo=	0.5	muf=	0.2	Vf=	37
16								
17	s	Fy	Fx					
18	0.00001	829.94563	0.25529684					
19	0.05	624.050015	919.541198					
20	0.1	391.302317	1135.47439					
21	0.2	200.479745	1154.20613					
22	0.25	156.545201	1124.88785					
23	0.3	126.599577	1090.59993					
24	0.35	105.075662	1055.34995					
25	0.4	88.9812771	1020.89218					
26	0.5	66.7785	957.102879					
27	0.6	52.4332373	901.458849					
28	0.75	38.7636232	832.773058					
29	0.99999	26.2111516	750.581944					
30								

.5 - 3000 - 66 - 4

	A	B	C	D	E	F	G	H
1	s	tan alpha	u	Fz	Cs	Calpha	Vs	mu
2	0.00001	0.06992679	66	3000	27000	24300	4.61516798	0.46481943
3	0.05	0.06992679	66	3000	27000	24300	5.67360336	0.45735124
4	0.1	0.06992679	66	3000	27000	24300	8.05355667	0.44131878
5	0.2	0.06992679	66	3000	27000	24300	13.9835537	0.40558274
6	0.25	0.06992679	66	3000	27000	24300	17.1332943	0.38880608
7	0.3	0.06992679	66	3000	27000	24300	20.3307593	0.37317497
8	0.35	0.06992679	66	3000	27000	24300	23.556523	0.35871652
9	0.4	0.06992679	66	3000	27000	24300	26.8003689	0.34539413
10	0.5	0.06992679	66	3000	27000	24300	33.3211611	0.32190116
11	0.6	0.06992679	66	3000	27000	24300	39.8680295	0.30213221
12	0.75	0.06992679	66	3000	27000	24300	49.7146837	0.27826828
13	0.99999	0.06992679	66	3000	27000	24300	66.1605068	0.25018221
14								
15	alpha (deg)=	4	muo=	0.5	muf=	0.2	Vf=	37
16								
17	s	Fy	Fx					
18	0.00001	1108.37211	0.16259588					
19	0.05	941.985387	686.000318					
20	0.1	682.484014	986.898199					
21	0.2	382.597599	1099.70936					
22	0.25	303.303061	1088.25383					
23	0.3	247.485308	1064.61547					
24	0.35	206.586928	1036.1439					
25	0.4	175.625536	1006.233					
26	0.5	132.439275	947.926314					
27	0.6	104.277588	895.299637					
28	0.75	77.2766107	829.067494					
29	0.99999	52.3559855	748.718262					
30								

Appendix D - Generic Truck Tire Data for a "0.5 Surface" - Fz = 6000 lbs.



.5 - 6000 - 22 - 0

	A	B	C	D	E	F	G	H
1	s	tan alpha	u	Fz	Cs	Calpha	Vs	mu
2	0.00001	1.7453E-08	22	6000	48000	43200	0.00022	0.49999822
3	0.05	1.7453E-08	22	6000	48000	43200	1.1	0.49121236
4	0.1	1.7453E-08	22	6000	48000	43200	2.2	0.48268212
5	0.2	1.7453E-08	22	6000	48000	43200	4.4	0.46636394
6	0.25	1.7453E-08	22	6000	48000	43200	5.5	0.45856156
7	0.3	1.7453E-08	22	6000	48000	43200	6.6	0.45098774
8	0.35	1.7453E-08	22	6000	48000	43200	7.7	0.44363577
9	0.4	1.7453E-08	22	6000	48000	43200	8.8	0.43649916
10	0.5	1.7453E-08	22	6000	48000	43200	11	0.42284694
11	0.6	1.7453E-08	22	6000	48000	43200	13.2	0.40998282
12	0.75	1.7453E-08	22	6000	48000	43200	16.5	0.39206551
13	0.99999	1.7453E-08	22	6000	48000	43200	21.99978	0.36553685
14								
15	alpha (deg)=	0.000001	muo=	0.5	muf=	0.2	Vf=	37
16								
17	s	Fy	Fx					
18	0.00001	0.00075399	0.4800048					
19	0.05	0.0006954	2087.68001					
20	0.1	0.00042922	2502.93555					
21	0.2	0.00022837	2635.06213					
22	0.25	0.00018291	2633.08761					
23	0.3	0.00015167	2616.94334					
24	0.35	0.00012894	2593.28163					
25	0.4	0.00011168	2565.40794					
26	0.5	8.7261E-05	2503.55674					
27	0.6	7.0876E-05	2438.88618					
28	0.75	5.4494E-05	2342.78587					
29	0.99999	3.8279E-05	2193.22085					
30								

.5 - 6000 - 22 - 1

	A	B	C	D	E	F	G	H
1	s	tan alpha	u	Fz	Cs	Calpha	Vs	mu
2	0.00001	0.01745506	22	6000	48000	43200	0.38401135	0.4969025
3	0.05	0.01745506	22	6000	48000	43200	1.16510286	0.49070041
4	0.1	0.01745506	22	6000	48000	43200	2.23326323	0.4824281
5	0.2	0.01745506	22	6000	48000	43200	4.41672556	0.46624356
6	0.25	0.01745506	22	6000	48000	43200	5.51338958	0.45846801
7	0.3	0.01745506	22	6000	48000	43200	6.61116213	0.45091203
8	0.35	0.01745506	22	6000	48000	43200	7.70956968	0.44357276
9	0.4	0.01745506	22	6000	48000	43200	8.80837469	0.43644563
10	0.5	0.01745506	22	6000	48000	43200	11.0067009	0.42280659
11	0.6	0.01745506	22	6000	48000	43200	13.2055846	0.40995113
12	0.75	0.01745506	22	6000	48000	43200	16.504468	0.39204232
13	0.99999	0.01745506	22	6000	48000	43200	22.0031312	0.36552186
14								
15	alpha (deg)=	1	muo=	0.5	muf=	0.2	Vf=	37
16								
17	s	Fy	Fx					
18	0.00001	754.066076	0.4800048					
19	0.05	673.804577	2015.07017					
20	0.1	423.804719	2470.32439					
21	0.2	227.534071	2625.06289					
22	0.25	182.467805	2626.46764					
23	0.3	151.416868	2612.25124					
24	0.35	128.778224	2589.78947					
25	0.4	111.571456	2562.71202					
26	0.5	87.2088814	2501.81737					
27	0.6	70.848473	2437.67684					
28	0.75	54.4818812	2342.01626					
29	0.99999	38.2757801	2192.79686					
30								

.5 - 6000 - 22 - 2

	A	B	C	D	E	F	G	H
1	s	tan alpha	u	Fz	Cs	Calpha	Vs	mu
2	0.00001	0.03492076	22	6000	48000	43200	0.76825669	0.49383512
3	0.05	0.03492076	22	6000	48000	43200	1.34172213	0.48931606
4	0.1	0.03492076	22	6000	48000	43200	2.33028288	0.4816885
5	0.2	0.03492076	22	6000	48000	43200	4.46656672	0.46588515
6	0.25	0.03492076	22	6000	48000	43200	5.553397	0.45818869
7	0.3	0.03492076	22	6000	48000	43200	6.64456306	0.45068563
8	0.35	0.03492076	22	6000	48000	43200	7.73823095	0.44338416
9	0.4	0.03492076	22	6000	48000	43200	8.83347147	0.43628531
10	0.5	0.03492076	22	6000	48000	43200	11.0267955	0.42268561
11	0.6	0.03492076	22	6000	48000	43200	13.2223379	0.40985609
12	0.75	0.03492076	22	6000	48000	43200	16.5178757	0.39197274
13	0.99999	0.03492076	22	6000	48000	43200	22.0131901	0.36547686
14								
15	alpha (deg)=	2	muo=	0.5	muf=	0.2	Vf=	37
16								
17	s	Fy	Fx					
18	0.00001	1508.10545	0.4735281					
19	0.05	1236.16203	1833.65485					
20	0.1	817.421164	2379.56469					
21	0.2	450.150977	2595.68071					
22	0.25	362.337667	2606.86918					
23	0.3	301.314962	2598.30217					
24	0.35	256.602705	2579.38111					
25	0.4	222.511576	2554.66334					
26	0.5	174.108612	2496.61412					
27	0.6	141.529753	2434.05518					
28	0.75	108.88966	2339.7094					
29	0.99999	76.530479	2191.52508					
30								

.5 - 6000 - 44 - 0

	A	B	C	D	E	F	G	H
1	s	tan alpha	u	Fz	Cs	Calpha	Vs	mu
2	0.00001	1.7453E-08	44	6000	48000	43200	0.00044	0.49999643
3	0.05	1.7453E-08	44	6000	48000	43200	2.2	0.48268212
4	0.1	1.7453E-08	44	6000	48000	43200	4.4	0.46636394
5	0.2	1.7453E-08	44	6000	48000	43200	8.8	0.43649916
6	0.25	1.7453E-08	44	6000	48000	43200	11	0.42284694
7	0.3	1.7453E-08	44	6000	48000	43200	13.2	0.40998282
8	0.35	1.7453E-08	44	6000	48000	43200	15.4	0.3978613
9	0.4	1.7453E-08	44	6000	48000	43200	17.6	0.3864395
10	0.5	1.7453E-08	44	6000	48000	43200	22	0.36553587
11	0.6	1.7453E-08	44	6000	48000	43200	26.4	0.34697595
12	0.75	1.7453E-08	44	6000	48000	43200	33	0.32296387
13	0.99999	1.7453E-08	44	6000	48000	43200	43.99956	0.2913415
14								
15	alpha (deg)=	0.000001	muo=	0.5	muf=	0.2	Vf=	37
16								
17	s	Fy	Fx					
18	0.00001	0.00075399	0.4800048					
19	0.05	0.00068901	2066.09424					
20	0.1	0.0004172	2431.16026					
21	0.2	0.00021469	2476.0963					
22	0.25	0.00016932	2436.50691					
23	0.3	0.00013836	2386.35933					
24	0.35	0.00011599	2332.04768					
25	0.4	9.9133E-05	2276.6364					
26	0.5	7.5586E-05	2168.1621					
27	0.6	6.0072E-05	2066.80666					
28	0.75	4.4926E-05	1931.26412					
29	0.99999	3.051E-05	1748.04881					
30								

.5 - 6000 - 22 - 4

	A	B	C	D	E	F	G	H
1	s	tan alpha	u	Fz	Cs	Calpha	Vs	mu
2	0.00001	0.06992679	22	6000	48000	43200	1.53838933	0.48778233
3	0.05	0.06992679	22	6000	48000	43200	1.89120112	0.48505123
4	0.1	0.06992679	22	6000	48000	43200	2.68451889	0.4790045
5	0.2	0.06992679	22	6000	48000	43200	4.66118458	0.46449028
6	0.25	0.06992679	22	6000	48000	43200	5.71109811	0.45709058
7	0.3	0.06992679	22	6000	48000	43200	6.77691978	0.44979048
8	0.35	0.06992679	22	6000	48000	43200	7.85217433	0.4426358
9	0.4	0.06992679	22	6000	48000	43200	8.93345631	0.43564766
10	0.5	0.06992679	22	6000	48000	43200	11.1070537	0.4222031
11	0.6	0.06992679	22	6000	48000	43200	13.2893432	0.40947639
12	0.75	0.06992679	22	6000	48000	43200	16.5715612	0.3916944
13	0.99999	0.06992679	22	6000	48000	43200	22.0535023	0.36529667
14								
15	alpha (deg)=	4	muo=	0.5	muf=	0.2	Vf=	37
16								
17	s	Fy	Fx					
18	0.00001	2217.82987	0.32730179					
19	0.05	1926.74989	1409.19716					
20	0.1	1444.94917	2095.26734					
21	0.2	863.795157	2486.59096					
22	0.25	704.879917	2532.17476					
23	0.3	590.883886	2544.33868					
24	0.35	505.760512	2538.73972					
25	0.4	440.064485	2523.04206					
26	0.5	345.770958	2476.02084					
27	0.6	281.731007	2419.66308					
28	0.75	217.188403	2330.51125					
29	0.99999	152.892294	2186.44062					
30								

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	A	B	C	D	E	F	G	H
1	s	tan alpha	u	Fz	Cs	Calpha	Vs	mu
2	0.00001	0.01745506	44	6000	48000	43200	0.76802271	0.49383697
3	0.05	0.01745506	44	6000	48000	43200	2.33020572	0.48168909
4	0.1	0.01745506	44	6000	48000	43200	4.46652647	0.46588544
5	0.2	0.01745506	44	6000	48000	43200	8.83345112	0.43628544
6	0.25	0.01745506	44	6000	48000	43200	11.0267792	0.42268571
7	0.3	0.01745506	44	6000	48000	43200	13.2223243	0.40985616
8	0.35	0.01745506	44	6000	48000	43200	15.4191394	0.39775897
9	0.4	0.01745506	44	6000	48000	43200	17.6167494	0.38635512
10	0.5	0.01745506	44	6000	48000	43200	22.0134018	0.36547592
11	0.6	0.01745506	44	6000	48000	43200	26.4111692	0.34693159
12	0.75	0.01745506	44	6000	48000	43200	33.008936	0.32293418
13	0.99999	0.01745506	44	6000	48000	43200	44.0062625	0.29132495
14								
15	alpha (deg)=	1	muo=	0.5	muf=	0.2	Vf=	37
16								
17	s	Fy	Fx					
18	0.00001	754.066076	0.4800048					
19	0.05	666.777273	1991.84876					
20	0.1	411.72006	2398.23694					
21	0.2	213.857454	2466.12012					
22	0.25	168.883444	2429.94466					
23	0.3	138.104575	2381.74083					
24	0.35	115.828293	2328.6364					
25	0.4	99.029898	2274.02426					
26	0.5	75.535954	2166.5061					
27	0.6	60.0455906	2065.67676					
28	0.75	44.9140148	1930.56615					
29	0.99999	30.5062196	1747.68332					
30								

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	A	B	C	D	E	F	G	H
1	s	tan alpha	u	Fz	Cs	Calpha	Vs	mu
2	0.00001	0.03492076	44	6000	48000	43200	1.53651337	0.48779692
3	0.05	0.03492076	44	6000	48000	43200	2.68344427	0.4790126
4	0.1	0.03492076	44	6000	48000	43200	4.66056575	0.46449471
5	0.2	0.03492076	44	6000	48000	43200	8.93313344	0.43564971
6	0.25	0.03492076	44	6000	48000	43200	11.106794	0.42220466
7	0.3	0.03492076	44	6000	48000	43200	13.2891261	0.40947762
8	0.35	0.03492076	44	6000	48000	43200	15.4764619	0.39745283
9	0.4	0.03492076	44	6000	48000	43200	17.6669429	0.38610249
10	0.5	0.03492076	44	6000	48000	43200	22.0535909	0.36529628
11	0.6	0.03492076	44	6000	48000	43200	26.4446757	0.34679859
12	0.75	0.03492076	44	6000	48000	43200	33.0357514	0.32284511
13	0.99999	0.03492076	44	6000	48000	43200	44.0263802	0.29127531
14								
15	alpha (deg)=	2	muo=	0.5	muf=	0.2	Vf=	37
16								
17	s	Fy	Fx					
18	0.00001	1507.23745	0.47226692					
19	0.05	1219.30334	1806.86188					
20	0.1	792.904298	2306.63875					
21	0.2	422.796544	2436.81064					
22	0.25	335.182299	2410.51999					
23	0.3	274.706545	2368.01246					
24	0.35	230.718327	2318.47043					
25	0.4	197.442247	2266.22665					
26	0.5	150.772899	2161.55276					
27	0.6	119.931183	2062.29334					
28	0.75	89.7580748	1928.47416					
29	0.99999	60.9927512	1746.58705					
30								

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	A	B	C	D	E	F	G	H
1	s	tan alpha	u	Fz	Cs	Calpha	Vs	mu
2	0.00001	0.06992679	44	6000	48000	43200	3.07677865	0.47606223
3	0.05	0.06992679	44	6000	48000	43200	3.78240224	0.47084735
4	0.1	0.06992679	44	6000	48000	43200	5.36903778	0.45947837
5	0.2	0.06992679	44	6000	48000	43200	9.32236916	0.4331837
6	0.25	0.06992679	44	6000	48000	43200	11.4221962	0.42031855
7	0.3	0.06992679	44	6000	48000	43200	13.5538396	0.40798428
8	0.35	0.06992679	44	6000	48000	43200	15.7043487	0.39624044
9	0.4	0.06992679	44	6000	48000	43200	17.8669126	0.38509939
10	0.5	0.06992679	44	6000	48000	43200	22.2141074	0.36458073
11	0.6	0.06992679	44	6000	48000	43200	26.5786863	0.34626786
12	0.75	0.06992679	44	6000	48000	43200	33.1431225	0.32248914
13	0.99999	0.06992679	44	6000	48000	43200	44.1070045	0.29107663
14								
15	alpha (deg)=	4	muo=	0.5	muf=	0.2	Vf=	37
16								
17	s	Fy	Fx					
18	0.00001	2181.16423	0.32157707					
19	0.05	1882.85352	1375.99159					
20	0.1	1393.9475	2020.02395					
21	0.2	809.096371	2328.05826					
22	0.25	650.679645	2336.5295					
23	0.3	537.796636	2314.93031					
24	0.35	454.115177	2278.79466					
25	0.4	390.03564	2235.6056					
26	0.5	299.180411	2141.95639					
27	0.6	238.591335	2048.85275					
28	0.75	178.95843	1920.13527					
29	0.99999	121.828034	1742.20527					
30								

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	A	B	C	D	E	F	G	H
1	s	tan alpha	u	Fz	Cs	Calpha	Vs	mu
2	0.00001	1.7453E-08	66	6000	48000	43200	0.00066	0.49999465
3	0.05	1.7453E-08	66	6000	48000	43200	3.3	0.47440175
4	0.1	1.7453E-08	66	6000	48000	43200	6.6	0.45098774
5	0.2	1.7453E-08	66	6000	48000	43200	13.2	0.40998282
6	0.25	1.7453E-08	66	6000	48000	43200	16.5	0.39206551
7	0.3	1.7453E-08	66	6000	48000	43200	19.8	0.37567705
8	0.35	1.7453E-08	66	6000	48000	43200	23.1	0.36068696
9	0.4	1.7453E-08	66	6000	48000	43200	26.4	0.34697595
10	0.5	1.7453E-08	66	6000	48000	43200	33	0.32296387
11	0.6	1.7453E-08	66	6000	48000	43200	39.6	0.30287475
12	0.75	1.7453E-08	66	6000	48000	43200	49.5	0.27872373
13	0.99999	1.7453E-08	66	6000	48000	43200	65.99934	0.25040128
14								
15	alpha (deg)=	0.000001	muo=	0.5	muf=	0.2	Vf=	37
16								
17	s	Fy	Fx					
18	0.00001	0.00075399	0.4800048					
19	0.05	0.00068262	2044.64487					
20	0.1	0.00040571	2362.70592					
21	0.2	0.00020244	2333.83249					
22	0.25	0.00015752	2265.92819					
23	0.3	0.00012714	2192.31648					
24	0.35	0.00010541	2118.82082					
25	0.4	8.9196E-05	2047.99536					
26	0.5	6.6883E-05	1918.22592					
27	0.6	5.2491E-05	1805.78185					
28	0.75	3.8792E-05	1667.48695					
29	0.99999	2.6222E-05	1502.40755					
30								

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	A	B	C	D	E	F	G	H
1	s	tan alpha	u	Fz	Cs	Calpha	Vs	mu
2	0.00001	0.01745506	66	6000	48000	43200	1.15203406	0.4908031
3	0.05	0.01745506	66	6000	48000	43200	3.49530858	0.47295711
4	0.1	0.01745506	66	6000	48000	43200	6.6997897	0.45031173
5	0.2	0.01745506	66	6000	48000	43200	13.2501767	0.40969825
6	0.25	0.01745506	66	6000	48000	43200	16.5401687	0.39185711
7	0.3	0.01745506	66	6000	48000	43200	19.8334864	0.37551812
8	0.35	0.01745506	66	6000	48000	43200	23.128709	0.36056233
9	0.4	0.01745506	66	6000	48000	43200	26.4251241	0.34687618
10	0.5	0.01745506	66	6000	48000	43200	33.0201027	0.32289708
11	0.6	0.01745506	66	6000	48000	43200	39.6167538	0.30282818
12	0.75	0.01745506	66	6000	48000	43200	49.5134041	0.27869522
13	0.99999	0.01745506	66	6000	48000	43200	66.0093937	0.25038758
14								
15	alpha (deg)=	1	muo=	0.5	muf=	0.2	Vf=	37
16								
17	s	Fy	Fx					
18	0.00001	754.066076	0.4800048					
19	0.05	659.776966	1968.85519					
20	0.1	400.184379	2329.55279					
21	0.2	201.611237	2323.94281					
22	0.25	157.090526	2259.4788					
23	0.3	126.89755	2187.81923					
24	0.35	105.254693	2115.5313					
25	0.4	89.0971131	2045.50176					
26	0.5	66.835702	1916.67758					
27	0.6	52.4662595	1804.74724					
28	0.75	38.7811307	1666.8668					
29	0.99999	26.2194458	1502.09657					
30								

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	A	B	C	D	E	F	G	H
1	s	tan alpha	u	Fz	Cs	Calpha	Vs	mu
2	0.00001	0.03492076	66	6000	48000	43200	2.30477006	0.4818828
3	0.05	0.03492076	66	6000	48000	43200	4.0251664	0.46907609
4	0.1	0.03492076	66	6000	48000	43200	6.99084863	0.44835039
5	0.2	0.03492076	66	6000	48000	43200	13.3997002	0.40885253
6	0.25	0.03492076	66	6000	48000	43200	16.660191	0.39123577
7	0.3	0.03492076	66	6000	48000	43200	19.9336892	0.37504343
8	0.35	0.03492076	66	6000	48000	43200	23.2146929	0.36018964
9	0.4	0.03492076	66	6000	48000	43200	26.5004144	0.34657761
10	0.5	0.03492076	66	6000	48000	43200	33.0803864	0.32269701
11	0.6	0.03492076	66	6000	48000	43200	39.6670136	0.30268859
12	0.75	0.03492076	66	6000	48000	43200	49.5536272	0.27860971
13	0.99999	0.03492076	66	6000	48000	43200	66.0395703	0.25034651
14								
15	alpha (deg)=	2	muo=	0.5	muf=	0.2	Vf=	37
16								
17	s	Fy	Fx					
18	0.00001	1505.96558	0.47092298					
19	0.05	1202.67133	1780.54153					
20	0.1	769.569797	2237.35456					
21	0.2	398.336957	2294.89434					
22	0.25	311.634051	2240.3922					
23	0.3	252.326638	2174.45374					
24	0.35	209.600342	2105.72981					
25	0.4	177.601199	2038.05913					
26	0.5	133.389465	1912.04684					
27	0.6	104.784462	1801.64949					
28	0.75	77.4994193	1665.00823					
29	0.99999	52.4223027	1501.16388					
30								

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	A	B	C	D	E	F	G	H
1	s	tan alpha	u	Fz	Cs	Calpha	Vs	mu
2	0.00001	0.06992679	66	6000	48000	43200	4.61516798	0.46481943
3	0.05	0.06992679	66	6000	48000	43200	5.67360336	0.45735124
4	0.1	0.06992679	66	6000	48000	43200	8.05355667	0.44131878
5	0.2	0.06992679	66	6000	48000	43200	13.9835537	0.40558274
6	0.25	0.06992679	66	6000	48000	43200	17.1332943	0.38880608
7	0.3	0.06992679	66	6000	48000	43200	20.3307593	0.37317497
8	0.35	0.06992679	66	6000	48000	43200	23.556523	0.35871652
9	0.4	0.06992679	66	6000	48000	43200	26.8003689	0.34539413
10	0.5	0.06992679	66	6000	48000	43200	33.3211611	0.32190116
11	0.6	0.06992679	66	6000	48000	43200	39.8680295	0.30213221
12	0.75	0.06992679	66	6000	48000	43200	49.7146837	0.27826828
13	0.99999	0.06992679	66	6000	48000	43200	66.1605068	0.25018221
14								
15	alpha (deg)=	4	muo=	0.5	muf=	0.2	Vf=	37
16								
17	s	Fy	Fx					
18	0.00001	2145.22267	0.3159865					
19	0.05	1840.44434	1343.99006					
20	0.1	1345.91256	1949.27086					
21	0.2	760.449922	2187.2038					
22	0.25	603.882835	2167.74508					
23	0.3	493.307726	2122.81023					
24	0.35	412.111081	2067.5003					
25	0.4	350.548409	2008.84852					
26	0.5	264.549529	1893.73528					
27	0.6	208.393198	1789.34843					
28	0.75	154.497995	1657.60189					
29	0.99999	104.71197	1497.43651					
30								