E. Topsakal
M. Carr
J. L. Volakis

CADRISA User Manual

Sikorsky Aircraft Corp.
1201 South Ave
Bridgeport, CT 06604

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Introduction

CADRISA is a sophisticated code employing the very latest numerical methods. It is numerically intensive and in some situations can take a long time to run when dealing with complex material geometries. *CADRISA* models electromagnetic scattering from PEC, resistive, impedance, circuit-analog, and dielectric media. *CADRISA* can also simulate geometries made up of multiple layers of these mixed media.

This manual will guide the user through compilation, execution, and data interpretation in such a way that *CADRISA* can be used most effectively. We will provide an example run, complete with results that can be used to verify the correct operation of the code.

Compilation

CADRISA is written in object-oriented, highly streamlined Fortran90 source code. A Fortran90 compiler is required to build the program.

CADRISA relies heavily on the latest numerical techniques, including BLAS for matrix manipulation, LAPACK for LU decomposition subroutines, and FFTPACK for FFT transforms and inverse transforms. At this time, *CADRISA* implements its own iterative solvers. Because numerical optimization of the routines above varies from platform to platform, we suggest that the user obtain libraries of these functions for their specific operating system. Most hardware manufacturers such as Intel, Sun, and SGI supply such numerical libraries free of charge. Check with your supplier for the availability of these libraries. If a generic implementation is desired for compatibility between various machines, platform-independent versions of these libraries can be found at www.netlib.org. However, *CADRISA*'s performance may suffer greatly without the benefit of optimized numerical libraries.

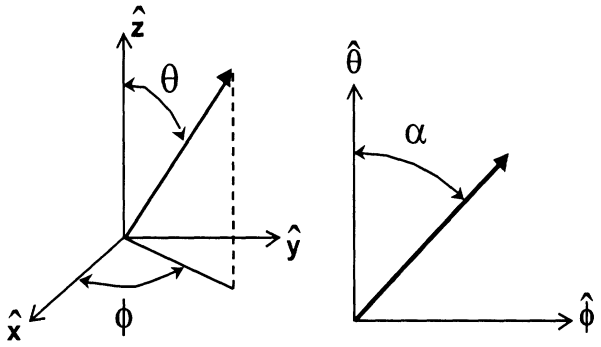
In summary, the following items are required to compile *CADRISA*:

- *CADRISA* FORTRAN 90 source files (*.f90)
- FORTRAN 90 compiler
- BLAS numerical routines library
- LAPACK numerical routines library
- FFTPACK numerical routines library

Execution

Before execution, the user must specify the incident angles of the plane wave excitation as well as the scattered-field look angles. These angles are all contained in the file INCIDENT.TXT, which must be located in the directory from which the program is executed. The first line of the INCIDENT.TXT file must contain the number of look angles. Each following line contains an angle specification for a single look angle. The syntax of the entire file is as follows, where the coordinate system is given in the diagram below:

<N = number of look angles>
<θ_i1> <ϕ_i1> <α1> <θ_s1> <ϕ_s1>
<θ_i2> <ϕ_i2> <α2> <θ_s2> <ϕ_s2>
.
.
.
<θ_iN> <ϕ_iN> <αN> <θ_sN> <ϕ_sN>



Coordinate System Reference

Please refer to the example below for a sample INCIDENT.TXT file.

When *CADRISA* is executed, it will prompt for a series of parameters. These parameters are explained below.

Geometry Input Filename

This is the input file containing the geometry under test. The file must adhere to Tricode File Format 2 specifications, which are given in Appendix A

RCS Output Filename

This is the name of the output file that will be produced. . Please see the section "Interpreting Results" below for more details.

Problem Type

As of this writing *CADRISA* can solve 22 RCS simulation problems. The problem descriptions are given in Appendix B. Certain problem types may prompt for additional data concerning the geometry. The problem types are:

0 PEC
1 Bulk Dielectric
2 PEC/Dielectric
3 Dielectric Coated PEC
4 Dielectric
5 Resistive
6 Impedance
7 Circuit Analog
8 Dielectric-Dielectric-PEC-PEC
9 Dielectric-Resistive-PEC-PEC
10 Dielectric-CABC-PEC-PEC
11 Dielectric-Dielectric-PEC-Impedance
12 Dielectric-Resistive-PEC-Impedance
13 Dielectric-CABC-PEC-Impedance
14 Dielectric-PEC-PEC
15 Dielectric-PEC-Impedance
16 Resistive-PEC-PEC
17 Resistive-PEC-Impedance
18 CABC-PEC-PEC
19 CABC-PEC-Impedance
20 PEC-Impedance
21 Impedance-PEC

Solver Type

Enter 0 to use a LU-factorization solver. This is a direct solver and can only be used with Method of Moments (MoM) simulations. For smaller problems, the LU solver offers the best performance. However, its complexity increases by $\mathbf{O}(N^3)$—therefore, larger problems will require fast methods such as the Adaptive Integral Method (AIM).

Enter 1 to use the conjugate-gradient-squared (CGS) method. This iterative method has an irregular convergence pattern, but often converges much faster than the benchmark BiCG iterative solver. If the AIM approach is to be employed, the user must select the iterative solver.

The **stopping residual** sets the point at which the iterative solver considers its answer converged. For coarse results, a value of 0.03 is usually sufficient for fairly accurate co-pol terms. For more accurate cross-pol terms, use a value of 0.001.

The **maximum iterations** sets the maximum number of iterations that the iterative solver will perform before aborting the procedure and proceeding to the following look angle. During iteration, the solver remembers the "best guess" based on the residual from each iteration. This best guess is then returned in the event that the number of iterations exceeds the maximum. The number of iterations actually required to converge to an answer varies depending on the condition of the Z-matrix, which is dictated by the geometry of the problem.

The iterative solver implemented in *CADRISA* uses the converged answer from each look angle as the initial guess for the following look angle. This often reduces the number of iterations for the new look angle dramatically. It is well known that CGS may diverge when the initial guess is very close to the true answer—however, we have not observed this behavior in our tests and feel that the reduction of iterations outweighs the potential for divergence.

Preconditioner Type

Preconditioners can cause an iterative solver to converge more quickly and with a smoother convergence pattern. They may also help systems to converge to a smaller residual if very accurate results are required. A good preconditioning matrix $[P]$ is measured by how closely $[P]$ approximates $[Z]^{-1}$. Generally speaking, the closer $[P]$ approximates $[Z]^{-1}$, the longer $[P]$ will take to generate. Therefore, the time required to generate $[P]$ must be weighed against the time saved by performing fewer iterations.

Entering 0 for this option uses no preconditioner. Mathematically speaking, $[P] = [I]$ where $[I]$ is the identity matrix.

Entering 1 uses a diagonal preconditioner—a sparse matrix consisting of the inverses of the entries along the main diagonal of the Z-matrix. This type of preconditioner can be generated very quickly, but usually has little effect on convergence. The preconditioning matrix is then specified by

$$P_{mn} = \begin{cases} 1/Z_{mn} & m = n \\ 0 & m \neq n \end{cases}$$

Entering 2 uses an approximate inverse preconditioner. This preconditioner often greatly accelerates convergence, but can require a large amount of time to generate. The preconditioning matrix approximates the inverse of the Z-matrix row-wise in a least-squares sense. Please refer to [2] for more information on this preconditioner. The **minimizing iterations** setting determines the number of iterations per row to generate the preconditioner. A good starting value for this parameter is 3. Larger numbers of minimizing iterations will consume large amounts of CPU time. The **% of AIPC to keep** setting determines the threshold for numerical dropping. This setting directly affects the sparsity of the AIPC matrix. A good starting value is 99—most terms are very small and even at this setting the AIPC will be less than 5% full.

Solution Methods

Entering 0 specifies the Moment Method (MoM). The complexity of this method is **O**(N^3), but for small problems it may be much faster than AIM due to its usage of the direct LU-factorization solver.

Entering 1 specifies the Adaptive Integral Method (AIM). This method complexity is **O**(N log N), but for small problems its iterative solver may take some time to converge. It is best used for larger geometries or monostatic simulations where the incident angle doesn't change. You must choose an iterative method for your solver in order to use AIM.

The **AIM grid spacing** determines the spacing between the grid points used to surround the geometry. At this time, *CADRISA* uses the same spacing for the x-, y-, and z-spacing between points. A good starting value for this parameter is 0.05. The **AIM threshold** determines the boundary where two basis functions are considered to be "far" from each other. Any basis functions inside this threshold will be included in the Z_{near} calculation, so making this parameter too small will increase fill time dramatically. A smaller value for this parameter will have little effect on the code since many terms will be dropped during the Z_{near} correction phase. A good starting value for this parameter is 0.2.

Interpreting Results

The output file contains the description of the scattered far-field at each look angle. Each line of the output file contains the incident field angles, the scattered field angles, and the real and imaginary components of the vector field. The syntax of the file is as follows:

<θ_i1> <ϕ_i1> <α1> <θ_s1> <ϕ_s1> <Re(E_θ1)> <Im(E_θ1)> <Re(E_ϕ1)> <Im(E_ϕ1)>
<θ_i2> <ϕ_i2> <α2> <θ_s2> <ϕ_s2> <Re(E_θ2)> <Im(E_θ2)> <Re(E_ϕ2)> <Im(E_ϕ2)>
.
.
.
<θ_iN> <ϕ_iN> <αN> <θ_sN> <ϕ_sN> <Re(E_θN)> <Im(E_θN)> <Re(E_ϕN)> <Im(E_ϕN)>

Therefore, the vector E-field can be expressed from the above data as follows:

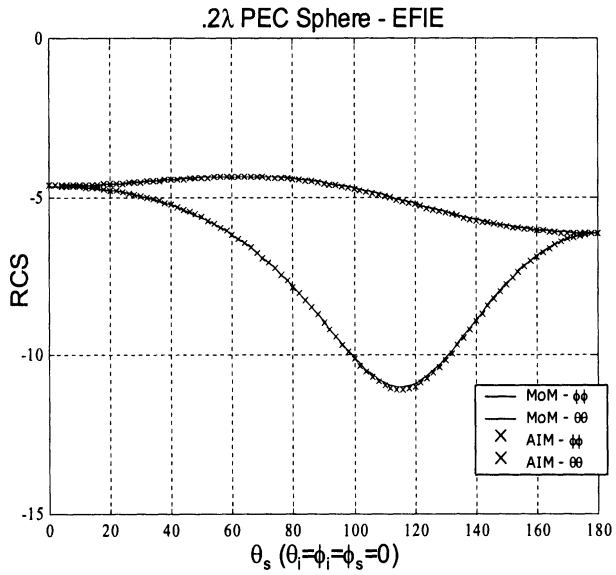
$$\mathbf{E}_n = \hat{\boldsymbol{\theta}}\left(\left\langle \mathrm{Re}\left(E_\theta n\right)\right\rangle + j\left\langle \mathrm{Im}\left(E_\theta n\right)\right\rangle\right) + \hat{\boldsymbol{\varphi}}\left(\left\langle \mathrm{Re}\left(E_\phi n\right)\right\rangle + j\left\langle \mathrm{Im}\left(E_\phi n\right)\right\rangle\right)$$

Example Run

The *CADRISA* distribution package contains the files necessary to reproduce a sphere test geometry. The files involved are:

- Sphere_Geometry.txt: The *CADRISA*-format file describing the sphere geometry
- Incident.txt: The incident angle file containing the bistatic view angles
- Sphere_Output_MoM.txt: The output file produced by running an LU solution
- Sphere_Output_AIM.txt: The output file produced by running an AIM solution
- Sphere.pdf: A summary of results and visualization of the sphere geometry

The calculated RCS patterns should appear as follows:



To reproduce these results, use the following inputs to the program:

MoM Calculation

```
 CADRISA - Multiple Surface, Multiple BC MoM Solution with AIM Capability
 Written by Michael Carr, University of Michigan, Radiation Laboratory
          Erdem Topsakal, University of Michigan, Radiation Laboratory
            John Volakis, University of Michigan, Radiation Laboratory

Geometry input filename? Sphere_Geometry.txt
    RCS output filename? Sphere_Output_MoM.txt


    42 nodes requiring        0 Kbytes
    80 faces requiring        4 Kbytes
   240 edges requiring      718 Kbytes
   120 unknowns in surface   1

 Problem geometries:
  0 - PEC
  1 - Bulk Dielectric
  2 - PEC/Dielectric
  3 - Coated PEC
  4 - Dielectric
           Problem type? 0
             CFIE alpha? 1

 Solver types:
  0 - Direct LU Decomposition (MoM only)
  1 - Conjugate Gradient Squared (CGS)
            Solver type? 0
```

AIM Calculation

```
 CADRISA - Multiple Surface, Multiple BC MoM Solution with AIM Capability
 Written by Michael Carr, University of Michigan, Radiation Laboratory
            Erdem Topsakal, University of Michigan, Radiation Laboratory
            John Volakis, University of Michigan, Radiation Laboratory

Geometry input filename? Sphere_Geometry.txt
    RCS output filename? Sphere_Output_AIM.txt
```

```
   42 nodes requiring        0 KBytes
   80 faces requiring        4 KBytes
  240 edges requiring      718 Kbytes
  120 unknowns in surface   1

Problem geometries:
 0 - PEC
 1 - Bulk Dielectric
 2 - PEC/Dielectric
 3 - Coated PEC
 4 - Dielectric
          Problem type? 0
            CFIE alpha? 1

Solver types:
 0 - Direct LU Decomposition (MoM only)
 1 - Conjugate Gradient Squared (CGS)
           Solver type? 1
     Stopping residual? 1e-3
    Maximum iterations? 1000

Preconditioner types:
 0 - No preconditioner
 1 - Diagonal preconditioner (DPC)
 2 - Approximate inverse preconditioner (AIPC)
        Preconditioner? 0

Solution methods:
 0 - Method of Moments (MoM)
 1 - Adaptive Integral Method (AIM)
       Solution method? 1
AIM threshold (lambda)? .2
      AIM grid spacing? .05
```

References

[1] E. Bleszynski, M. Bleszynski, and T. Jaroszewicz, "*AIM: Adaptive integral method for solving large-scale electromagnetics scattering and radiation problems*," Radio Science, v 31, no 5, pp 1225-1251, Sept-Oct 1996.

[2] Saad, Yousef. Iterative Methods for Sparse Linear Systems. 1996 PWS Publishing Co, Boston, MA.

APPENDIX A – Cadrisa File Format Specification

1. The first line is a format identifier, "TFF2" for Tricode File Format version 2
2. The next line holds the number of nodes followed on the same same line by the number of triangles.
3. The list of nodes comes next, in X, Y, Z format where **the units are wavelengths**.
4. The list of triangles comes next, in N1, N2, N3, S format, where S is an integer identifying the surface.

NOTE 1: The order in which the nodes are listed is very important. The surface normal is determined as such:

$$\hat{\mathbf{n}} = \frac{(\mathbf{n}_2 - \mathbf{n}_1) \times (\mathbf{n}_3 - \mathbf{n}_2)}{\left|(\mathbf{n}_2 - \mathbf{n}_1) \times (\mathbf{n}_3 - \mathbf{n}_2)\right|}$$

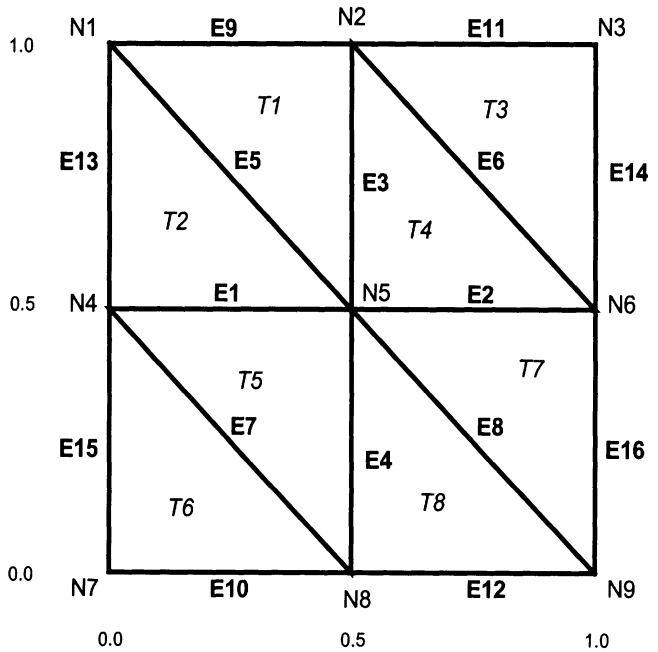
NOTE 2: The surface numbering does not necessarily start with 1 and is not required to be numbered sequentially.

```
<N=number of nodes> <T=number of triangles>
<node #1 x coordinate> <node #1 y coordinate> <node #1 z coordinate>
<node #2 x coordinate> <node #2 y coordinate> <node #2 z coordinate>
  .
  .
  .
<node #N x coordinate> <node #N y coordinate> <node #N z coordinate>
<triangle #1 edge1> <triangle #1 edge2> <triangle #1 edge3> <triangle #1 surface>
<triangle #2 edge1> <triangle #2 edge2> <triangle #2 edge3> <triangle #2 surface>
  .
  .
  .
<triangle #T node1> <triangle #T node2> <triangle #T node3> <triangle #T surface>
```

EXAMPLE:

```
TFF2
9 8
0.0 0.0 0.0
0.5 0.0 0.0
1.0 0.0 0.0
0.0 0.5 0.0
0.5 0.5 0.0
1.0 0.5 0.0
0.0 1.0 0.0
0.5 1.0 0.0
1.0 1.0 0.0
 1  5  2  1
 1  4  5  1
 2  6  3  1
 2  5  6  1
 4  8  5  1
 4  7  8  1
 5  9  6  1
 5  8  9  1
```

This example is for surface normals pointing out of the paper, with only one surface present.

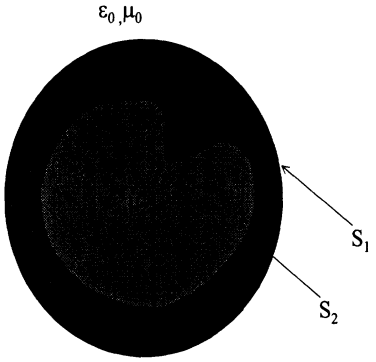


APPENDIX B – Problem Geometries

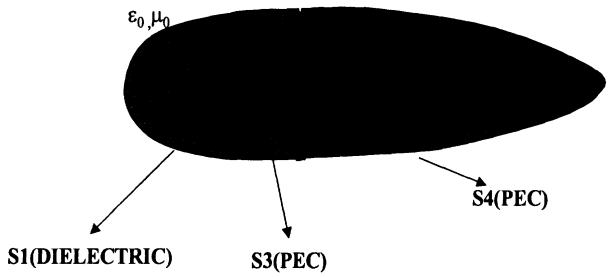
This version of the code has the capability of solving 22 different types of problems. In the future the code will be generalized to treat any combination of the surfaces without restrictions to these combinations. At this time the user is permitted to only enter a case number from the list below.

Case 0 - PEC Boundary

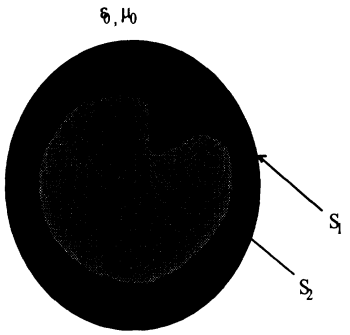
Case 1 – Bulk Dielectric



Case 2 – PEC/Dielectric



Case 3 – Dielectric Coated PEC



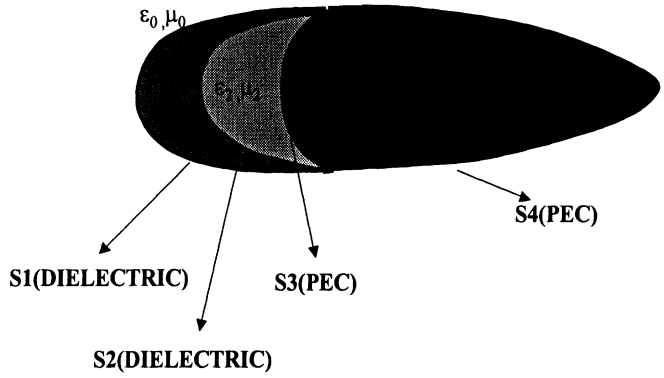
Case 4 – Dielectric Boundary

Case 5 – Resistive Boundary

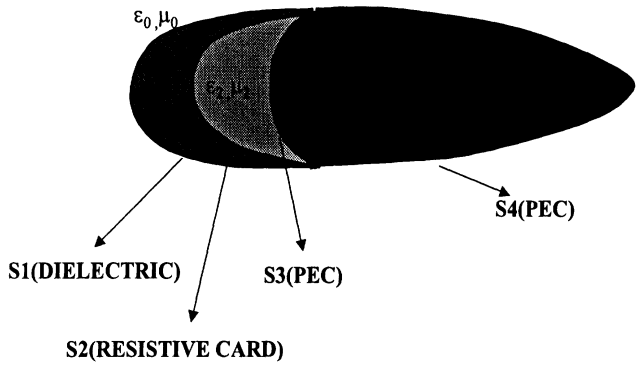
Subcase: 0 - Resistive Sheet in a free space

Subcase: 1 - Sheet saparetes different mediums

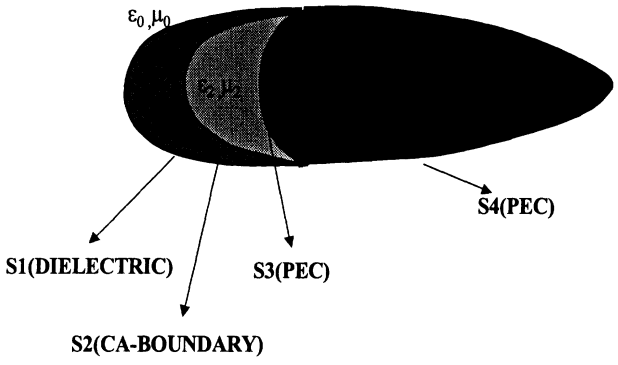
Case 6 – Impedance Boundary
Case 7 – CABC (Circuit Analog Boundary)
Case 8 – Dielectric-Dielectric-PEC-PEC



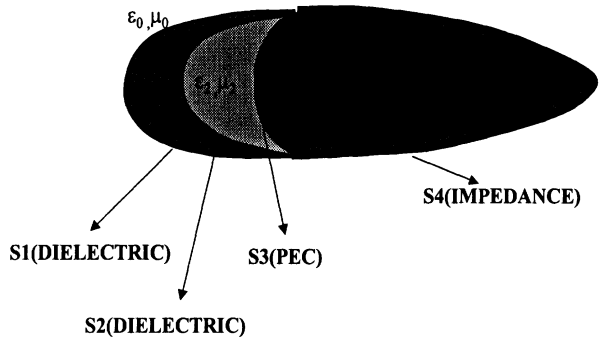
Case 9 – Dielectric-Resistive-PEC-PEC



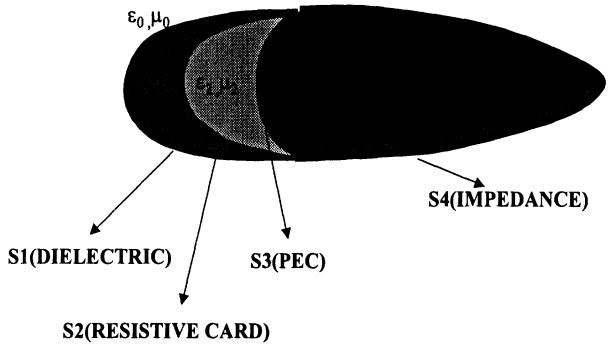
Case 10 – Dielectric-CABC-PEC-PEC



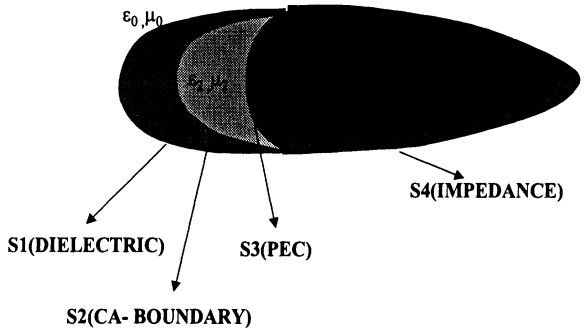
Case 11 – Dielectric-Dielectric-PEC-Impedance



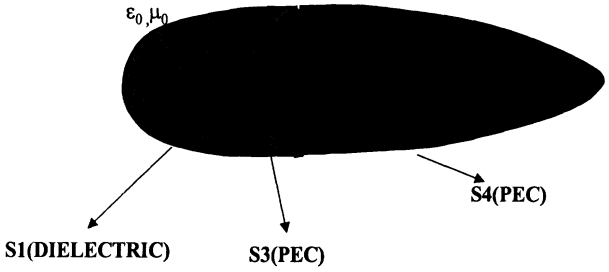
Case 12 – Dielectric-Resistive-PEC-Impedance



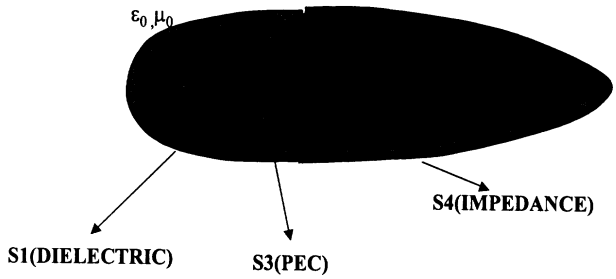
Case 13 – Dielectric-CABC-PEC-Impedance



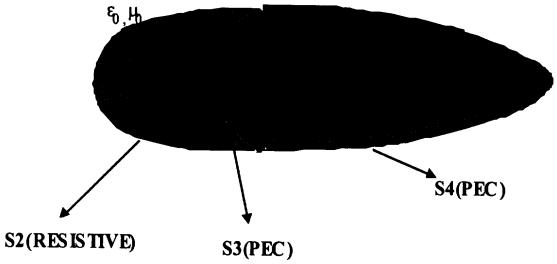
Case 14 – Dielectric-PEC-PEC



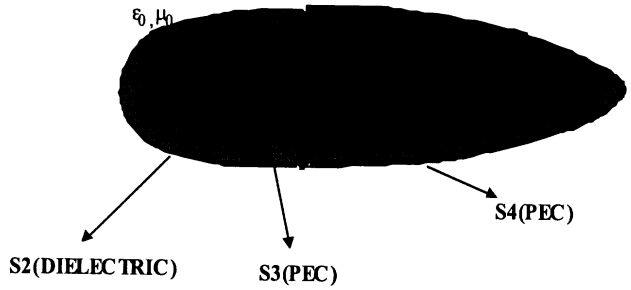
Case 15 – Dielectric-PEC-Impedance



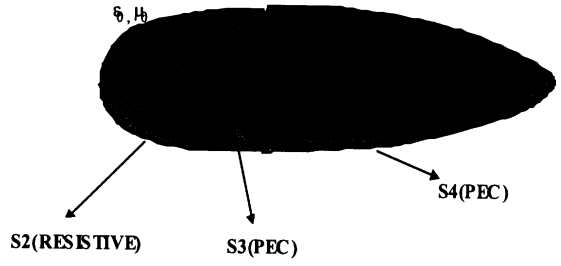
Case 16 – Resistive-PEC-PEC



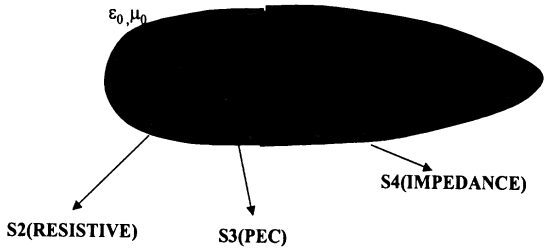
Case 15 – Dielectric-PEC-PEC



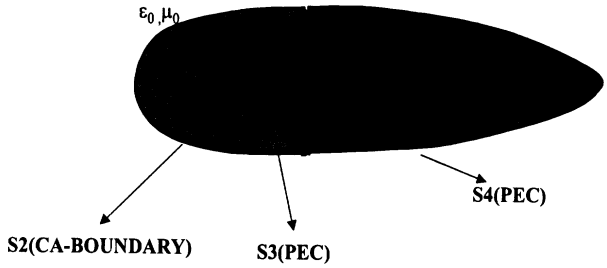
Case 16 – Resistive-PEC-PEC



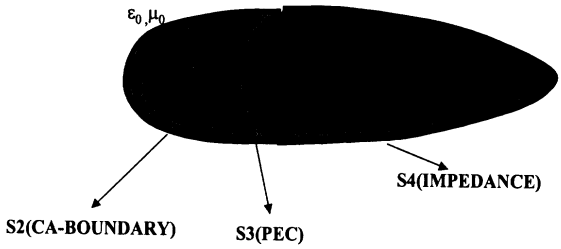
Case 17 – Resistive-PEC-Impedance



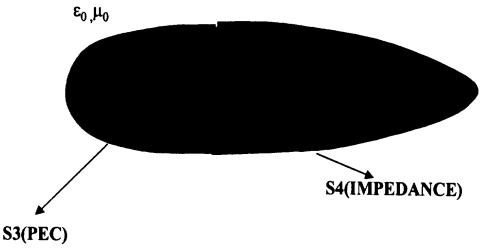
Case 18 – CABC-PEC-PEC



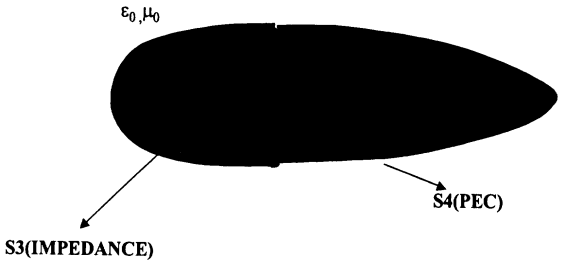
Case 19 – CABC-PEC-Impedance



Case 20 – PEC-Impedance



Case 21 – Impedance-PEC



APPENDIX C – Sphere Benchmark Test

Sphere Geometry Input File

```
TFF2
          42          80
  0.11755700E+00  0.00000000E+00  0.16180301E+00
  0.19021100E+00  0.00000000E+00  0.61803401E-01
  0.19021100E+00  0.00000000E+00 -0.61803401E-01
  0.11755700E+00  0.00000000E+00 -0.16180301E+00
  0.95105700E-01  0.69098003E-01  0.16180301E+00
  0.15388399E+00  0.11180300E+00  0.61803401E-01
  0.15388399E+00  0.11180300E+00 -0.61803401E-01
  0.95105700E-01  0.69098003E-01 -0.16180301E+00
  0.36327101E-01  0.11180300E+00  0.16180301E+00
  0.58778498E-01  0.18090200E+00  0.61803401E-01
  0.58778498E-01  0.18090200E+00 -0.61803401E-01
  0.36327101E-01  0.11180300E+00 -0.16180301E+00
 -0.36327101E-01  0.11180300E+00  0.16180301E+00
 -0.58778498E-01  0.18090200E+00  0.61803401E-01
 -0.58778498E-01  0.18090200E+00 -0.61803401E-01
 -0.36327101E-01  0.11180300E+00 -0.16180301E+00
 -0.95105700E-01  0.69098003E-01  0.16180301E+00
 -0.15388399E+00  0.11180300E+00  0.61803401E-01
 -0.15388399E+00  0.11180300E+00 -0.61803401E-01
 -0.95105700E-01  0.69098003E-01 -0.16180301E+00
 -0.11755700E+00  0.00000000E+00  0.16180301E+00
 -0.19021100E+00  0.00000000E+00  0.61803401E-01
 -0.19021100E+00  0.00000000E+00 -0.61803401E-01
 -0.11755700E+00  0.00000000E+00 -0.16180301E+00
 -0.95105603E-01 -0.69098003E-01  0.16180301E+00
 -0.15388399E+00 -0.11180300E+00  0.61803401E-01
 -0.15388399E+00 -0.11180300E+00 -0.61803401E-01
 -0.95105603E-01 -0.69098003E-01 -0.16180301E+00
 -0.36327101E-01 -0.11180300E+00  0.16180301E+00
 -0.58778599E-01 -0.18090200E+00  0.61803401E-01
 -0.58778498E-01 -0.18090200E+00 -0.61803401E-01
 -0.36327101E-01 -0.11180300E+00 -0.16180301E+00
  0.36327101E-01 -0.11180300E+00  0.16180301E+00
  0.58778599E-01 -0.18090200E+00  0.61803401E-01
  0.58778599E-01 -0.18090200E+00 -0.61803401E-01
  0.36327101E-01 -0.11180300E+00 -0.16180301E+00
  0.95105700E-01 -0.69098003E-01  0.16180301E+00
  0.15388399E+00 -0.11180300E+00  0.61803401E-01
  0.15388399E+00 -0.11180300E+00 -0.61803401E-01
  0.95105700E-01 -0.69098003E-01 -0.16180301E+00
  0.00000000E+00  0.00000000E+00  0.20000000E+00
  0.00000000E+00  0.00000000E+00 -0.20000000E+00
     2       6       1       1
     1       6       5       1
     3       7       2       1
     2       7       6       1
     4       8       3       1
     3       8       7       1
     6      10       5       1
     5      10       9       1
     7      11       6       1
     6      11      10       1
     8      12       7       1
     7      12      11       1
    10      14       9       1
     9      14      13       1
    11      15      10       1
    10      15      14       1
    12      16      11       1
    11      16      15       1
    14      18      13       1
    13      18      17       1
    15      19      14       1
    14      19      18       1
```

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16      20      15      1
15      20      19      1
18      22      17      1
17      22      21      1
19      23      18      1
18      23      22      1
20      24      19      1
19      24      23      1
22      26      21      1
21      26      25      1
23      27      22      1
22      27      26      1
24      28      23      1
23      28      27      1
26      30      25      1
25      30      29      1
27      31      26      1
26      31      30      1
28      32      27      1
27      32      31      1
30      34      29      1
29      34      33      1
31      35      30      1
30      35      34      1
32      36      31      1
31      36      35      1
34      38      33      1
33      38      37      1
35      39      34      1
34      39      38      1
36      40      35      1
35      40      39      1
38       2      37      1
37       2       1      1
39       3      38      1
38       3       2      1
40       4      39      1
39       4       3      1
 1       5      41      1
 5       9      41      1
 9      13      41      1
13      17      41      1
17      21      41      1
21      25      41      1
25      29      41      1
29      33      41      1
33      37      41      1
37       1      41      1
42       8       4      1
42      12       8      1
42      16      12      1
42      20      16      1
42      24      20      1
42      28      24      1
42      32      28      1
42      36      32      1
42      40      36      1
42       4      40      1
```

Incident Angle File

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182
0 0 0 0 0
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0 0 0 4 0
0 0 0 6 0
0 0 0 8 0
0 0 0 10  0
0 0 0 12  0
0 0 0 14  0
```

```
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0 0 0 20  0
0 0 0 22  0
0 0 0 24  0
0 0 0 26  0
0 0 0 28  0
0 0 0 30  0
0 0 0 32  0
0 0 0 34  0
0 0 0 36  0
0 0 0 38  0
0 0 0 40  0
0 0 0 42  0
0 0 0 44  0
0 0 0 46  0
0 0 0 48  0
0 0 0 50  0
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0 0 0 70  0
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0 0 0 74  0
0 0 0 76  0
0 0 0 78  0
0 0 0 80  0
0 0 0 82  0
0 0 0 84  0
0 0 0 86  0
0 0 0 88  0
0 0 0 90  0
0 0 0 92  0
0 0 0 94  0
0 0 0 96  0
0 0 0 98  0
0 0 0 100  0
0 0 0 102  0
0 0 0 104  0
0 0 0 106  0
0 0 0 108  0
0 0 0 110  0
0 0 0 112  0
0 0 0 114  0
0 0 0 116  0
0 0 0 118  0
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0 0 0 142  0
0 0 0 144  0
0 0 0 146  0
0 0 0 148  0
0 0 0 150  0
0 0 0 152  0
0 0 0 154  0
0 0 0 156  0
```

```
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 0 0 0 164  0
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 0 0 0 176  0
 0 0 0 178  0
 0 0 0 180  0
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 0 0 90  6 0
 0 0 90  8 0
 0 0 90 10  0
 0 0 90 12  0
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 0 0 90 88  0
 0 0 90 90  0
 0 0 90 92  0
 0 0 90 94  0
 0 0 90 96  0
 0 0 90 98  0
 0 0 90 100  0
 0 0 90 102  0
 0 0 90 104  0
 0 0 90 106  0
 0 0 90 108  0
 0 0 90 110  0
 0 0 90 112  0
 0 0 90 114  0
 0 0 90 116  0
```

```
0 0 90 118  0
0 0 90 120  0
0 0 90 122  0
0 0 90 124  0
0 0 90 126  0
0 0 90 128  0
0 0 90 130  0
0 0 90 132  0
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0 0 90 172  0
0 0 90 174  0
0 0 90 176  0
0 0 90 178  0
0 0 90 180  0
```

MoM Results

0.0	0.0	0.0	0.0	0.0	0.14720708E+00	-0.75131476E-01	0.67763502E-03	0.55001600E-03
0.0	0.0	0.0	2.0	0.0	0.14720617E+00	-0.75075954E-01	0.67767908E-03	0.55032375E-03
0.0	0.0	0.0	4.0	0.0	0.14720324E+00	-0.74909538E-01	0.67781244E-03	0.55125228E-03
0.0	0.0	0.0	6.0	0.0	0.14719759E+00	-0.74632309E-01	0.67803403E-03	0.55280048E-03
0.0	0.0	0.0	8.0	0.0	0.14718843E+00	-0.74244455E-01	0.67835097E-03	0.55498525E-03
0.0	0.0	0.0	10.0	0.0	0.14717439E+00	-0.73746257E-01	0.67876111E-03	0.55780914E-03
0.0	0.0	0.0	12.0	0.0	0.14715376E+00	-0.73138043E-01	0.67927310E-03	0.56127767E-03
0.0	0.0	0.0	14.0	0.0	0.14712453E+00	-0.72420284E-01	0.67989138E-03	0.56541932E-03
0.0	0.0	0.0	16.0	0.0	0.14708431E+00	-0.71593471E-01	0.68062701E-03	0.57024643E-03
0.0	0.0	0.0	18.0	0.0	0.14703043E+00	-0.70658192E-01	0.68147806E-03	0.57578017E-03
0.0	0.0	0.0	20.0	0.0	0.14695963E+00	-0.69615208E-01	0.68246154E-03	0.58203755E-03
0.0	0.0	0.0	22.0	0.0	0.14686875E+00	-0.68465210E-01	0.68358571E-03	0.58903894E-03
0.0	0.0	0.0	24.0	0.0	0.14675398E+00	-0.67209139E-01	0.68485428E-03	0.59681095E-03
0.0	0.0	0.0	26.0	0.0	0.14661138E+00	-0.65847918E-01	0.68628264E-03	0.60536910E-03
0.0	0.0	0.0	28.0	0.0	0.14643672E+00	-0.64382590E-01	0.68788172E-03	0.61474351E-03
0.0	0.0	0.0	30.0	0.0	0.14622562E+00	-0.62814385E-01	0.68966643E-03	0.62494440E-03
0.0	0.0	0.0	32.0	0.0	0.14597324E+00	-0.61144501E-01	0.69164537E-03	0.63600478E-03
0.0	0.0	0.0	34.0	0.0	0.14567475E+00	-0.59374355E-01	0.69383084E-03	0.64793054E-03
0.0	0.0	0.0	36.0	0.0	0.14532515E+00	-0.57505425E-01	0.69623999E-03	0.66074572E-03
0.0	0.0	0.0	38.0	0.0	0.14491905E+00	-0.55539273E-01	0.69888157E-03	0.67446206E-03
0.0	0.0	0.0	40.0	0.0	0.14445119E+00	-0.53477630E-01	0.70177240E-03	0.68909087E-03
0.0	0.0	0.0	42.0	0.0	0.14391616E+00	-0.51322345E-01	0.70492446E-03	0.70464006E-03
0.0	0.0	0.0	44.0	0.0	0.14330848E+00	-0.49075320E-01	0.70835109E-03	0.72111096E-03
0.0	0.0	0.0	46.0	0.0	0.14262250E+00	-0.46738714E-01	0.71206165E-03	0.73850580E-03
0.0	0.0	0.0	48.0	0.0	0.14185278E+00	-0.44314630E-01	0.71607146E-03	0.75682363E-03
0.0	0.0	0.0	50.0	0.0	0.14099376E+00	-0.41805461E-01	0.72039838E-03	0.77605294E-03
0.0	0.0	0.0	52.0	0.0	0.14004013E+00	-0.39213657E-01	0.72504190E-03	0.79616538E-03
0.0	0.0	0.0	54.0	0.0	0.13898650E+00	-0.36541745E-01	0.73001964E-03	0.81715640E-03
0.0	0.0	0.0	56.0	0.0	0.13782759E+00	-0.33792548E-01	0.73534221E-03	0.83899224E-03
0.0	0.0	0.0	58.0	0.0	0.13655859E+00	-0.30968828E-01	0.74101670E-03	0.86163881E-03
0.0	0.0	0.0	60.0	0.0	0.13517454E+00	-0.28073553E-01	0.74704335E-03	0.88505604E-03
0.0	0.0	0.0	62.0	0.0	0.13367108E+00	-0.25109887E-01	0.75344212E-03	0.90919214E-03
0.0	0.0	0.0	64.0	0.0	0.13204381E+00	-0.22081036E-01	0.76020305E-03	0.93399949E-03
0.0	0.0	0.0	66.0	0.0	0.13028887E+00	-0.18990392E-01	0.76733349E-03	0.95940422E-03
0.0	0.0	0.0	68.0	0.0	0.12840270E+00	-0.15841395E-01	0.77484339E-03	0.98534580E-03
0.0	0.0	0.0	70.0	0.0	0.12638211E+00	-0.12637662E-01	0.78271999E-03	0.10117401E-02

0.0	0.0	0.0	72.0	0.0	0.12422441E+00	-0.93829902E-02	0.79097290E-03	0.10384958E-02
0.0	0.0	0.0	74.0	0.0	0.12192734E+00	-0.60811550E-02	0.79959101E-03	0.10655264E-02
0.0	0.0	0.0	76.0	0.0	0.11948894E+00	-0.27360753E-02	0.80857595E-03	0.10927229E-02
0.0	0.0	0.0	78.0	0.0	0.11690817E+00	0.64814178E-03	0.81790838E-03	0.11199816E-02
0.0	0.0	0.0	80.0	0.0	0.11418424E+00	0.40673781E-02	0.82758989E-03	0.11471779E-02
0.0	0.0	0.0	82.0	0.0	0.11131698E+00	0.75173783E-02	0.83760312E-03	0.11741965E-02
0.0	0.0	0.0	84.0	0.0	0.10830681E+00	0.10993848E-01	0.84793585E-03	0.12009093E-02
0.0	0.0	0.0	86.0	0.0	0.10515488E+00	0.14492335E-01	0.85858058E-03	0.12271770E-02
0.0	0.0	0.0	88.0	0.0	0.10186284E+00	0.18008409E-01	0.86950831E-03	0.12528686E-02
0.0	0.0	0.0	90.0	0.0	0.98433129E-01	0.21537557E-01	0.88070740E-03	0.12778357E-02
0.0	0.0	0.0	92.0	0.0	0.94868682E-01	0.25075164E-01	0.89215924E-03	0.13019489E-02
0.0	0.0	0.0	94.0	0.0	0.91173165E-01	0.28616644E-01	0.90385025E-03	0.13250525E-02
0.0	0.0	0.0	96.0	0.0	0.87351039E-01	0.32157335E-01	0.91573939E-03	0.13470200E-02
0.0	0.0	0.0	98.0	0.0	0.83407164E-01	0.35692528E-01	0.92781900E-03	0.13677106E-02
0.0	0.0	0.0	100.0	0.0	0.79347409E-01	0.39217580E-01	0.94004843E-03	0.13869822E-02
0.0	0.0	0.0	102.0	0.0	0.75177930E-01	0.42727746E-01	0.95241738E-03	0.14047178E-02
0.0	0.0	0.0	104.0	0.0	0.70905901E-01	0.46218365E-01	0.96488750E-03	0.14207929E-02
0.0	0.0	0.0	106.0	0.0	0.66538908E-01	0.49684718E-01	0.97744260E-03	0.14350979E-02
0.0	0.0	0.0	108.0	0.0	0.62085133E-01	0.53122174E-01	0.99004293E-03	0.14475280E-02
0.0	0.0	0.0	110.0	0.0	0.57553492E-01	0.56526117E-01	0.10026582E-02	0.14580030E-02
0.0	0.0	0.0	112.0	0.0	0.52953459E-01	0.59891921E-01	0.10152769E-02	0.14664405E-02
0.0	0.0	0.0	114.0	0.0	0.48294973E-01	0.63215107E-01	0.10278469E-02	0.14727844E-02
0.0	0.0	0.0	116.0	0.0	0.43588445E-01	0.66491164E-01	0.10403659E-02	0.14769883E-02
0.0	0.0	0.0	118.0	0.0	0.38844835E-01	0.69715694E-01	0.10527752E-02	0.14790334E-02
0.0	0.0	0.0	120.0	0.0	0.34075733E-01	0.72884291E-01	0.10650657E-02	0.14789079E-02
0.0	0.0	0.0	122.0	0.0	0.29292775E-01	0.75992830E-01	0.10772120E-02	0.14766122E-02
0.0	0.0	0.0	124.0	0.0	0.24508113E-01	0.79037048E-01	0.10891736E-02	0.14721981E-02
0.0	0.0	0.0	126.0	0.0	0.19734221E-01	0.82012951E-01	0.11009366E-02	0.14656929E-02
0.0	0.0	0.0	128.0	0.0	0.14983750E-01	0.84916517E-01	0.11124680E-02	0.14571836E-02
0.0	0.0	0.0	130.0	0.0	0.10269609E-01	0.87743893E-01	0.11237516E-02	0.14467489E-02
0.0	0.0	0.0	132.0	0.0	0.56049903E-02	0.90491429E-01	0.11347508E-02	0.14344973E-02
0.0	0.0	0.0	134.0	0.0	0.10028643E-02	0.93155354E-01	0.11454555E-02	0.14205567E-02
0.0	0.0	0.0	136.0	0.0	-0.35234476E-02	0.95732301E-01	0.11558348E-02	0.14050765E-02
0.0	0.0	0.0	138.0	0.0	-0.79607777E-02	0.98218806E-01	0.11658757E-02	0.13881973E-02
0.0	0.0	0.0	140.0	0.0	-0.12296110E-01	0.10061166E+00	0.11755583E-02	0.13701119E-02
0.0	0.0	0.0	142.0	0.0	-0.16516421E-01	0.10290784E+00	0.11848628E-02	0.13510010E-02
0.0	0.0	0.0	144.0	0.0	-0.20608896E-01	0.10510426E+00	0.11937744E-02	0.13310628E-02
0.0	0.0	0.0	146.0	0.0	-0.24561040E-01	0.10719818E+00	0.12022759E-02	0.13105066E-02
0.0	0.0	0.0	148.0	0.0	-0.28360594E-01	0.10918692E+00	0.12103603E-02	0.12895487E-02
0.0	0.0	0.0	150.0	0.0	-0.31995688E-01	0.11106782E+00	0.12180078E-02	0.12684058E-02
0.0	0.0	0.0	152.0	0.0	-0.35454918E-01	0.11283866E+00	0.12252100E-02	0.12472958E-02
0.0	0.0	0.0	154.0	0.0	-0.38727179E-01	0.11449715E+00	0.12319525E-02	0.12264593E-02
0.0	0.0	0.0	156.0	0.0	-0.41802045E-01	0.11604113E+00	0.12382368E-02	0.12061036E-02
0.0	0.0	0.0	158.0	0.0	-0.44669580E-01	0.11746885E+00	0.12440379E-02	0.11864470E-02
0.0	0.0	0.0	160.0	0.0	-0.47320496E-01	0.11877825E+00	0.12493611E-02	0.11677109E-02
0.0	0.0	0.0	162.0	0.0	-0.49746174E-01	0.11996790E+00	0.12541945E-02	0.11500800E-02
0.0	0.0	0.0	164.0	0.0	-0.51938586E-01	0.12103637E+00	0.12585333E-02	0.11337571E-02
0.0	0.0	0.0	166.0	0.0	-0.53890582E-01	0.12198223E+00	0.12623715E-02	0.11189071E-02
0.0	0.0	0.0	168.0	0.0	-0.55595610E-01	0.12280427E+00	0.12657068E-02	0.11056939E-02
0.0	0.0	0.0	170.0	0.0	-0.57048049E-01	0.12350160E+00	0.12685340E-02	0.10942671E-02
0.0	0.0	0.0	172.0	0.0	-0.58243103E-01	0.12407327E+00	0.12708538E-02	0.10847425E-02
0.0	0.0	0.0	174.0	0.0	-0.59176784E-01	0.12451865E+00	0.12726592E-02	0.10772230E-02
0.0	0.0	0.0	176.0	0.0	-0.59845932E-01	0.12483719E+00	0.12739480E-02	0.10717963E-02
0.0	0.0	0.0	178.0	0.0	-0.60248330E-01	0.12502842E+00	0.12747237E-02	0.10685165E-02
0.0	0.0	0.0	180.0	0.0	-0.60382608E-01	0.12509224E+00	0.12749826E-02	0.10674181E-02
0.0	0.0	90.0	0.0	0.0	-0.67758805E-03	-0.54996274E-03	0.14720736E+00	-0.75132020E-01
0.0	0.0	90.0	2.0	0.0	-0.67753589E-03	-0.55020320E-03	0.14721350E+00	-0.75147994E-01
0.0	0.0	90.0	4.0	0.0	-0.67738094E-03	-0.55092090E-03	0.14723210E+00	-0.75195849E-01
0.0	0.0	90.0	6.0	0.0	-0.67711395E-03	-0.55210822E-03	0.14726271E+00	-0.75275585E-01
0.0	0.0	90.0	8.0	0.0	-0.67672966E-03	-0.55377564E-03	0.14730483E+00	-0.75387105E-01
0.0	0.0	90.0	10.0	0.0	-0.67621499E-03	-0.55590994E-03	0.14735773E+00	-0.75530179E-01
0.0	0.0	90.0	12.0	0.0	-0.67555491E-03	-0.55851013E-03	0.14742053E+00	-0.75704724E-01
0.0	0.0	90.0	14.0	0.0	-0.67473960E-03	-0.56156475E-03	0.14749229E+00	-0.75910501E-01
0.0	0.0	90.0	16.0	0.0	-0.67373185E-03	-0.56507596E-03	0.14757155E+00	-0.76147154E-01
0.0	0.0	90.0	18.0	0.0	-0.67252159E-03	-0.56901947E-03	0.14765681E+00	-0.76414444E-01
0.0	0.0	90.0	20.0	0.0	-0.67108154E-03	-0.57338394E-03	0.14774659E+00	-0.76712050E-01
0.0	0.0	90.0	22.0	0.0	-0.66938309E-03	-0.57817635E-03	0.14783902E+00	-0.77039517E-01
0.0	0.0	90.0	24.0	0.0	-0.66738535E-03	-0.58335904E-03	0.14793210E+00	-0.77396527E-01
0.0	0.0	90.0	26.0	0.0	-0.66506100E-03	-0.58893178E-03	0.14802364E+00	-0.77782497E-01
0.0	0.0	90.0	28.0	0.0	-0.66238170E-03	-0.59485948E-03	0.14811139E+00	-0.78197017E-01
0.0	0.0	90.0	30.0	0.0	-0.65928965E-03	-0.60112169E-03	0.14819282E+00	-0.78639507E-01

0.0	0.0	90.0	32.0	0.0	-0.65576879E-03	-0.60769869E-03	0.14826557E+00	-0.79109453E-01
0.0	0.0	90.0	34.0	0.0	-0.65175921E-03	-0.61454671E-03	0.14832680E+00	-0.79606086E-01
0.0	0.0	90.0	36.0	0.0	-0.64723456E-03	-0.62165048E-03	0.14837381E+00	-0.80128878E-01
0.0	0.0	90.0	38.0	0.0	-0.64213626E-03	-0.62895822E-03	0.14840373E+00	-0.80677159E-01
0.0	0.0	90.0	40.0	0.0	-0.63642487E-03	-0.63643279E-03	0.14841336E+00	-0.81250124E-01
0.0	0.0	90.0	42.0	0.0	-0.63006202E-03	-0.64401893E-03	0.14839980E+00	-0.81847109E-01
0.0	0.0	90.0	44.0	0.0	-0.62298850E-03	-0.65168104E-03	0.14835998E+00	-0.82467280E-01
0.0	0.0	90.0	46.0	0.0	-0.61516004E-03	-0.65935001E-03	0.14829074E+00	-0.83109871E-01
0.0	0.0	90.0	48.0	0.0	-0.60653884E-03	-0.66697638E-03	0.14818895E+00	-0.83773978E-01
0.0	0.0	90.0	50.0	0.0	-0.59708237E-03	-0.67446684E-03	0.14805135E+00	-0.84458649E-01
0.0	0.0	90.0	52.0	0.0	-0.58674562E-03	-0.68178703E-03	0.14787461E+00	-0.85163116E-01
0.0	0.0	90.0	54.0	0.0	-0.57546317E-03	-0.68884232E-03	0.14765593E+00	-0.85886426E-01
0.0	0.0	90.0	56.0	0.0	-0.56320685E-03	-0.69554069E-03	0.14739189E+00	-0.86627573E-01
0.0	0.0	90.0	58.0	0.0	-0.54994988E-03	-0.70180814E-03	0.14707972E+00	-0.87385602E-01
0.0	0.0	90.0	60.0	0.0	-0.53564267E-03	-0.70753106E-03	0.14671627E+00	-0.88159449E-01
0.0	0.0	90.0	62.0	0.0	-0.52021886E-03	-0.71264891E-03	0.14629868E+00	-0.88948168E-01
0.0	0.0	90.0	64.0	0.0	-0.50369563E-03	-0.71703584E-03	0.14582428E+00	-0.89750730E-01
0.0	0.0	90.0	66.0	0.0	-0.48602899E-03	-0.72059635E-03	0.14529039E+00	-0.90565957E-01
0.0	0.0	90.0	68.0	0.0	-0.46714317E-03	-0.72322082E-03	0.14469452E+00	-0.91392800E-01
0.0	0.0	90.0	70.0	0.0	-0.44708254E-03	-0.72480261E-03	0.14403448E+00	-0.92230260E-01
0.0	0.0	90.0	72.0	0.0	-0.42578377E-03	-0.72524173E-03	0.14330810E+00	-0.93077175E-01
0.0	0.0	90.0	74.0	0.0	-0.40323869E-03	-0.72439318E-03	0.14251368E+00	-0.93932346E-01
0.0	0.0	90.0	76.0	0.0	-0.37944925E-03	-0.72216644E-03	0.14164937E+00	-0.94794765E-01
0.0	0.0	90.0	78.0	0.0	-0.35438099E-03	-0.71845157E-03	0.14071386E+00	-0.95663257E-01
0.0	0.0	90.0	80.0	0.0	-0.32806720E-03	-0.71312994E-03	0.13970600E+00	-0.96536651E-01
0.0	0.0	90.0	82.0	0.0	-0.30046617E-03	-0.70610305E-03	0.13862507E+00	-0.97413778E-01
0.0	0.0	90.0	84.0	0.0	-0.27160908E-03	-0.69725711E-03	0.13747042E+00	-0.98293535E-01
0.0	0.0	90.0	86.0	0.0	-0.24152789E-03	-0.68652979E-03	0.13624190E+00	-0.99174708E-01
0.0	0.0	90.0	88.0	0.0	-0.21021097E-03	-0.67379884E-03	0.13493955E+00	-0.10005634E+00
0.0	0.0	90.0	90.0	0.0	-0.17768733E-03	-0.65896899E-03	0.13356379E+00	-0.10093716E+00
0.0	0.0	90.0	92.0	0.0	-0.14399749E-03	-0.64200221E-03	0.13211551E+00	-0.10181596E+00
0.0	0.0	90.0	94.0	0.0	-0.10917544E-03	-0.62276964E-03	0.13059579E+00	-0.10269170E+00
0.0	0.0	90.0	96.0	0.0	-0.73268020E-04	-0.60129754E-03	0.12900607E+00	-0.10356326E+00
0.0	0.0	90.0	98.0	0.0	-0.36309790E-04	-0.57747844E-03	0.12734829E+00	-0.10442954E+00
0.0	0.0	90.0	100.0	0.0	0.16251905E-05	-0.55127282E-03	0.12562466E+00	-0.10528950E+00
0.0	0.0	90.0	102.0	0.0	0.40518302E-04	-0.52273460E-03	0.12383781E+00	-0.10614195E+00
0.0	0.0	90.0	104.0	0.0	0.80257945E-04	-0.49179344E-03	0.12199068E+00	-0.10698595E+00
0.0	0.0	90.0	106.0	0.0	0.12079219E-03	-0.45848518E-03	0.12008648E+00	-0.10782035E+00
0.0	0.0	90.0	108.0	0.0	0.16205323E-03	-0.42281780E-03	0.11812922E+00	-0.10864428E+00
0.0	0.0	90.0	110.0	0.0	0.20393971E-03	-0.38485098E-03	0.11612267E+00	-0.10945661E+00
0.0	0.0	90.0	112.0	0.0	0.24639955E-03	-0.34465455E-03	0.11407126E+00	-0.11025639E+00
0.0	0.0	90.0	114.0	0.0	0.28930101E-03	-0.30230242E-03	0.11197980E+00	-0.11104276E+00
0.0	0.0	90.0	116.0	0.0	0.33256898E-03	-0.25785700E-03	0.10985321E+00	-0.11181486E+00
0.0	0.0	90.0	118.0	0.0	0.37612091E-03	-0.21149454E-03	0.10769687E+00	-0.11257164E+00
0.0	0.0	90.0	120.0	0.0	0.41983655E-03	-0.16324093E-03	0.10551634E+00	-0.11331236E+00
0.0	0.0	90.0	122.0	0.0	0.46360542E-03	-0.11334363E-03	0.10331743E+00	-0.11403606E+00
0.0	0.0	90.0	124.0	0.0	0.50733105E-03	-0.61927443E-04	0.10110635E+00	-0.11474212E+00
0.0	0.0	90.0	126.0	0.0	0.55089284E-03	-0.91342254E-05	0.98889276E-01	-0.11542971E+00
0.0	0.0	90.0	128.0	0.0	0.59419079E-03	0.44817996E-04	0.96672721E-01	-0.11609813E+00
0.0	0.0	90.0	130.0	0.0	0.63709135E-03	0.99696117E-04	0.94463326E-01	-0.11674658E+00
0.0	0.0	90.0	132.0	0.0	0.67950715E-03	0.15530204E-03	0.92267886E-01	-0.11737451E+00
0.0	0.0	90.0	134.0	0.0	0.72129723E-03	0.21141004E-03	0.90093181E-01	-0.11798121E+00
0.0	0.0	90.0	136.0	0.0	0.76236302E-03	0.26778111E-03	0.87946177E-01	-0.11856613E+00
0.0	0.0	90.0	138.0	0.0	0.80257794E-03	0.32413937E-03	0.85833751E-01	-0.11912867E+00
0.0	0.0	90.0	140.0	0.0	0.84182218E-03	0.38028252E-03	0.83762974E-01	-0.11966838E+00
0.0	0.0	90.0	142.0	0.0	0.87999064E-03	0.43590003E-03	0.81740670E-01	-0.12018467E+00
0.0	0.0	90.0	144.0	0.0	0.91698056E-03	0.49071893E-03	0.79773672E-01	-0.12067711E+00
0.0	0.0	90.0	146.0	0.0	0.95266424E-03	0.54451195E-03	0.77868775E-01	-0.12114520E+00
0.0	0.0	90.0	148.0	0.0	0.98694849E-03	0.59696625E-03	0.76032586E-01	-0.12158860E+00
0.0	0.0	90.0	150.0	0.0	0.10197257E-02	0.64785802E-03	0.74271485E-01	-0.12200689E+00
0.0	0.0	90.0	152.0	0.0	0.10509015E-02	0.69689855E-03	0.72591774E-01	-0.12239978E+00
0.0	0.0	90.0	154.0	0.0	0.10803656E-02	0.74383005E-03	0.70999399E-01	-0.12276690E+00
0.0	0.0	90.0	156.0	0.0	0.11080423E-02	0.78840455E-03	0.69500133E-01	-0.12310795E+00
0.0	0.0	90.0	158.0	0.0	0.11338394E-02	0.83038863E-03	0.68099469E-01	-0.12342265E+00
0.0	0.0	90.0	160.0	0.0	0.11576760E-02	0.86955907E-03	0.66802435E-01	-0.12371080E+00
0.0	0.0	90.0	162.0	0.0	0.11794763E-02	0.90570183E-03	0.65613858E-01	-0.12397210E+00
0.0	0.0	90.0	164.0	0.0	0.11991775E-02	0.93858299E-03	0.64538129E-01	-0.12420646E+00
0.0	0.0	90.0	166.0	0.0	0.12167074E-02	0.96807739E-03	0.63579239E-01	-0.12441359E+00
0.0	0.0	90.0	168.0	0.0	0.12320178E-02	0.99397392E-03	0.62740773E-01	-0.12459350E+00
0.0	0.0	90.0	170.0	0.0	0.12450592E-02	0.10161351E-02	0.62025879E-01	-0.12474583E+00
0.0	0.0	90.0	172.0	0.0	0.12557844E-02	0.10344463E-02	0.61437272E-01	-0.12487067E+00

0.0	0.0	90.0	174.0	0.0	0.12641622E-02	0.10487986E-02	0.60977105E-01	-0.12496782E+00
0.0	0.0	90.0	176.0	0.0	0.12701667E-02	0.10591118E-02	0.60647175E-01	-0.12503728E+00
0.0	0.0	90.0	178.0	0.0	0.12737777E-02	0.10653227E-02	0.60448721E-01	-0.12507905E+00
0.0	0.0	90.0	180.0	0.0	0.12749812E-02	0.10673963E-02	0.60382474E-01	-0.12509289E+00

AIM Results

0.0	0.0	0.0	0.0	0.0	0.14785652E+00	-0.74161217E-01	0.67668606E-03	0.53283386E-03
0.0	0.0	0.0	2.0	0.0	0.14785652E+00	-0.74106939E-01	0.67579566E-03	0.53252769E-03
0.0	0.0	0.0	4.0	0.0	0.14785296E+00	-0.73942557E-01	0.67547779E-03	0.53313328E-03
0.0	0.0	0.0	6.0	0.0	0.14784546E+00	-0.73668182E-01	0.67574013E-03	0.53466327E-03
0.0	0.0	0.0	8.0	0.0	0.14783290E+00	-0.73284045E-01	0.67658187E-03	0.53712883E-03
0.0	0.0	0.0	10.0	0.0	0.14781407E+00	-0.72790340E-01	0.67799544E-03	0.54053211E-03
0.0	0.0	0.0	12.0	0.0	0.14778732E+00	-0.72187588E-01	0.67997671E-03	0.54489064E-03
0.0	0.0	0.0	14.0	0.0	0.14775057E+00	-0.71476102E-01	0.68250694E-03	0.55021280E-03
0.0	0.0	0.0	16.0	0.0	0.14770159E+00	-0.70656464E-01	0.68557251E-03	0.55649830E-03
0.0	0.0	0.0	18.0	0.0	0.14763753E+00	-0.69729298E-01	0.68914780E-03	0.56376267E-03
0.0	0.0	0.0	20.0	0.0	0.14755552E+00	-0.68695292E-01	0.69320254E-03	0.57201326E-03
0.0	0.0	0.0	22.0	0.0	0.14745203E+00	-0.67555286E-01	0.69770723E-03	0.58125617E-03
0.0	0.0	0.0	24.0	0.0	0.14732353E+00	-0.66310182E-01	0.70263125E-03	0.59148757E-03
0.0	0.0	0.0	26.0	0.0	0.14716619E+00	-0.64960912E-01	0.70793316E-03	0.60271390E-03
0.0	0.0	0.0	28.0	0.0	0.14697567E+00	-0.63508622E-01	0.71358104E-03	0.61493722E-03
0.0	0.0	0.0	30.0	0.0	0.14674771E+00	-0.61954387E-01	0.71952160E-03	0.62815112E-03
0.0	0.0	0.0	32.0	0.0	0.14647752E+00	-0.60299650E-01	0.72572584E-03	0.64234645E-03
0.0	0.0	0.0	34.0	0.0	0.14616036E+00	-0.58545746E-01	0.73214725E-03	0.65751723E-03
0.0	0.0	0.0	36.0	0.0	0.14579110E+00	-0.56694131E-01	0.73874067E-03	0.67364500E-03
0.0	0.0	0.0	38.0	0.0	0.14536472E+00	-0.54746430E-01	0.74546249E-03	0.69071533E-03
0.0	0.0	0.0	40.0	0.0	0.14487575E+00	-0.52704401E-01	0.75227977E-03	0.70870202E-03
0.0	0.0	0.0	42.0	0.0	0.14431897E+00	-0.50569784E-01	0.75915444E-03	0.72759099E-03
0.0	0.0	0.0	44.0	0.0	0.14368878E+00	-0.48344679E-01	0.76603855E-03	0.74733747E-03
0.0	0.0	0.0	46.0	0.0	0.14297977E+00	-0.46031088E-01	0.77290280E-03	0.76791772E-03
0.0	0.0	0.0	48.0	0.0	0.14218649E+00	-0.43631148E-01	0.77972445E-03	0.78929309E-03
0.0	0.0	0.0	50.0	0.0	0.14130342E+00	-0.41147236E-01	0.78645843E-03	0.81141177E-03
0.0	0.0	0.0	52.0	0.0	0.14032517E+00	-0.38581766E-01	0.79310162E-03	0.83424285E-03
0.0	0.0	0.0	54.0	0.0	0.13924651E+00	-0.35937332E-01	0.79961494E-03	0.85771619E-03
0.0	0.0	0.0	56.0	0.0	0.13806227E+00	-0.33216566E-01	0.80598914E-03	0.88178465E-03
0.0	0.0	0.0	58.0	0.0	0.13676748E+00	-0.30422384E-01	0.81222685E-03	0.90638216E-03
0.0	0.0	0.0	60.0	0.0	0.13535735E+00	-0.27557597E-01	0.81829354E-03	0.93144539E-03
0.0	0.0	0.0	62.0	0.0	0.13382737E+00	-0.24625314E-01	0.82420884E-03	0.95689832E-03
0.0	0.0	0.0	64.0	0.0	0.13217346E+00	-0.21628775E-01	0.82996237E-03	0.98266476E-03
0.0	0.0	0.0	66.0	0.0	0.13039154E+00	-0.18571246E-01	0.83556847E-03	0.10086719E-02
0.0	0.0	0.0	68.0	0.0	0.12847815E+00	-0.15456135E-01	0.84102806E-03	0.10348305E-02
0.0	0.0	0.0	70.0	0.0	0.12643014E+00	-0.12287010E-01	0.84636139E-03	0.10610499E-02
0.0	0.0	0.0	72.0	0.0	0.12424472E+00	-0.90675279E-02	0.85158541E-03	0.10872314E-02
0.0	0.0	0.0	74.0	0.0	0.12191974E+00	-0.58014235E-02	0.85670967E-03	0.11132840E-02
0.0	0.0	0.0	76.0	0.0	0.11945334E+00	-0.24926215E-02	0.86177833E-03	0.11391011E-02
0.0	0.0	0.0	78.0	0.0	0.11684425E+00	0.85496955E-03	0.86679868E-03	0.11645809E-02
0.0	0.0	0.0	80.0	0.0	0.11409179E+00	0.42372015E-02	0.87181205E-03	0.11896160E-02
0.0	0.0	0.0	82.0	0.0	0.11119585E+00	0.76500038E-02	0.87683822E-03	0.12140946E-02
0.0	0.0	0.0	84.0	0.0	0.10815689E+00	0.11089088E-01	0.88192121E-03	0.12379034E-02
0.0	0.0	0.0	86.0	0.0	0.10497594E+00	0.14550179E-01	0.88707439E-03	0.12609360E-02
0.0	0.0	0.0	88.0	0.0	0.10165463E+00	0.18028876E-01	0.89234725E-03	0.12830714E-02
0.0	0.0	0.0	90.0	0.0	0.98195516E-01	0.21520736E-01	0.89775532E-03	0.13042040E-02
0.0	0.0	0.0	92.0	0.0	0.94601475E-01	0.25021262E-01	0.90334198E-03	0.13242164E-02
0.0	0.0	0.0	94.0	0.0	0.90876199E-01	0.28525950E-01	0.90913079E-03	0.13430039E-02
0.0	0.0	0.0	96.0	0.0	0.87024041E-01	0.32030191E-01	0.91516215E-03	0.13604654E-02
0.0	0.0	0.0	98.0	0.0	0.83050020E-01	0.35529409E-01	0.92144212E-03	0.13765023E-02
0.0	0.0	0.0	100.0	0.0	0.78959793E-01	0.39019000E-01	0.92801283E-03	0.13910154E-02
0.0	0.0	0.0	102.0	0.0	0.74759826E-01	0.42494290E-01	0.93488360E-03	0.14039245E-02
0.0	0.0	0.0	104.0	0.0	0.70456982E-01	0.45950722E-01	0.94208610E-03	0.14151511E-02
0.0	0.0	0.0	106.0	0.0	0.66058949E-01	0.49383622E-01	0.94962836E-03	0.14246261E-02
0.0	0.0	0.0	108.0	0.0	0.61574012E-01	0.52788451E-01	0.95752312E-03	0.14322959E-02
0.0	0.0	0.0	110.0	0.0	0.57011016E-01	0.56160640E-01	0.96577767E-03	0.14381094E-02
0.0	0.0	0.0	112.0	0.0	0.52379508E-01	0.59495598E-01	0.97440346E-03	0.14420346E-02
0.0	0.0	0.0	114.0	0.0	0.47689382E-01	0.62788874E-01	0.98339154E-03	0.14440584E-02
0.0	0.0	0.0	116.0	0.0	0.42951126E-01	0.66036083E-01	0.99274423E-03	0.14441649E-02
0.0	0.0	0.0	118.0	0.0	0.38175721E-01	0.69232844E-01	0.10024521E-02	0.14423742E-02
0.0	0.0	0.0	120.0	0.0	0.33374671E-01	0.72374731E-01	0.10125029E-02	0.14387058E-02
0.0	0.0	0.0	122.0	0.0	0.28559797E-01	0.75457670E-01	0.10228865E-02	0.14331989E-02
0.0	0.0	0.0	124.0	0.0	0.23743194E-01	0.78477450E-01	0.10335715E-02	0.14259082E-02
0.0	0.0	0.0	126.0	0.0	0.18937463E-01	0.81430040E-01	0.10445394E-02	0.14169090E-02

0.0	0.0	0.0	128.0	0.0	0.14155295E-01	0.84311523E-01	0.10557668E-02	0.14062858E-02
0.0	0.0	0.0	130.0	0.0	0.94096335E-02	0.87118015E-01	0.10672192E-02	0.13941376E-02
0.0	0.0	0.0	132.0	0.0	0.47135712E-02	0.89845702E-01	0.10788604E-02	0.13805822E-02
0.0	0.0	0.0	134.0	0.0	0.80485035E-04	0.92491031E-01	0.10906432E-02	0.13657486E-02
0.0	0.0	0.0	136.0	0.0	-0.44765011E-02	0.95050469E-01	0.11025446E-02	0.13497833E-02
0.0	0.0	0.0	138.0	0.0	-0.89441258E-02	0.97520716E-01	0.11145091E-02	0.13328232E-02
0.0	0.0	0.0	140.0	0.0	-0.13309188E-01	0.99898480E-01	0.11264860E-02	0.13150455E-02
0.0	0.0	0.0	142.0	0.0	-0.17558616E-01	0.10218053E+00	0.11384264E-02	0.12966157E-02
0.0	0.0	0.0	144.0	0.0	-0.21679515E-01	0.10436403E+00	0.11502845E-02	0.12777089E-02
0.0	0.0	0.0	146.0	0.0	-0.25659310E-01	0.10644595E+00	0.11620037E-02	0.12585112E-02
0.0	0.0	0.0	148.0	0.0	-0.29485654E-01	0.10842371E+00	0.11735326E-02	0.12392100E-02
0.0	0.0	0.0	150.0	0.0	-0.33146612E-01	0.11029473E+00	0.11848080E-02	0.12199878E-02
0.0	0.0	0.0	152.0	0.0	-0.36630612E-01	0.11205654E+00	0.11957771E-02	0.12010382E-02
0.0	0.0	0.0	154.0	0.0	-0.39926577E-01	0.11370694E+00	0.12063858E-02	0.11825447E-02
0.0	0.0	0.0	156.0	0.0	-0.43023869E-01	0.11524373E+00	0.12165847E-02	0.11646941E-02
0.0	0.0	0.0	158.0	0.0	-0.45912515E-01	0.11666497E+00	0.12263037E-02	0.11476600E-02
0.0	0.0	0.0	160.0	0.0	-0.48583157E-01	0.11796886E+00	0.12354996E-02	0.11316066E-02
0.0	0.0	0.0	162.0	0.0	-0.51027052E-01	0.11915370E+00	0.12441202E-02	0.11166965E-02
0.0	0.0	0.0	164.0	0.0	-0.53236183E-01	0.12021803E+00	0.12521113E-02	0.11030788E-02
0.0	0.0	0.0	166.0	0.0	-0.55203203E-01	0.12116049E+00	0.12594245E-02	0.10908935E-02
0.0	0.0	0.0	168.0	0.0	-0.56921661E-01	0.12197979E+00	0.12660141E-02	0.10802582E-02
0.0	0.0	0.0	170.0	0.0	-0.58385774E-01	0.12267499E+00	0.12718452E-02	0.10712753E-02
0.0	0.0	0.0	172.0	0.0	-0.59590697E-01	0.12324522E+00	0.12768741E-02	0.10640445E-02
0.0	0.0	0.0	174.0	0.0	-0.60532399E-01	0.12368962E+00	0.12810689E-02	0.10586384E-02
0.0	0.0	0.0	176.0	0.0	-0.61207689E-01	0.12400790E+00	0.12843960E-02	0.10551095E-02
0.0	0.0	0.0	178.0	0.0	-0.61614353E-01	0.12419941E+00	0.12868358E-02	0.10534977E-02
0.0	0.0	0.0	180.0	0.0	-0.61751008E-01	0.12426392E+00	0.12883655E-02	0.10538162E-02
0.0	0.0	90.0	0.0	0.0	-0.67368220E-03	-0.58097992E-03	0.14791155E+00	-0.73959664E-01
0.0	0.0	90.0	2.0	0.0	-0.67167502E-03	-0.58095815E-03	0.14791693E+00	-0.73974684E-01
0.0	0.0	90.0	4.0	0.0	-0.66957949E-03	-0.58132788E-03	0.14793333E+00	-0.74020058E-01
0.0	0.0	90.0	6.0	0.0	-0.66739693E-03	-0.58208365E-03	0.14796072E+00	-0.74095845E-01
0.0	0.0	90.0	8.0	0.0	-0.66511886E-03	-0.58323628E-03	0.14799866E+00	-0.74201956E-01
0.0	0.0	90.0	10.0	0.0	-0.66274503E-03	-0.58477954E-03	0.14804627E+00	-0.74338272E-01
0.0	0.0	90.0	12.0	0.0	-0.66025282E-03	-0.58672612E-03	0.14810276E+00	-0.74504688E-01
0.0	0.0	90.0	14.0	0.0	-0.65763830E-03	-0.58906933E-03	0.14816718E+00	-0.74701041E-01
0.0	0.0	90.0	16.0	0.0	-0.65487571E-03	-0.59182366E-03	0.14823818E+00	-0.74927136E-01
0.0	0.0	90.0	18.0	0.0	-0.65195194E-03	-0.59497514E-03	0.14831445E+00	-0.75182825E-01
0.0	0.0	90.0	20.0	0.0	-0.64883195E-03	-0.59852429E-03	0.14839429E+00	-0.75467743E-01
0.0	0.0	90.0	22.0	0.0	-0.64550317E-03	-0.60248148E-03	0.14847617E+00	-0.75781740E-01
0.0	0.0	90.0	24.0	0.0	-0.64192491E-03	-0.60683943E-03	0.14855795E+00	-0.76124437E-01
0.0	0.0	90.0	26.0	0.0	-0.63806766E-03	-0.61159435E-03	0.14863770E+00	-0.76495513E-01
0.0	0.0	90.0	28.0	0.0	-0.63389604E-03	-0.61672903E-03	0.14871322E+00	-0.76894633E-01
0.0	0.0	90.0	30.0	0.0	-0.62937557E-03	-0.62224775E-03	0.14878207E+00	-0.77321269E-01
0.0	0.0	90.0	32.0	0.0	-0.62448031E-03	-0.62812940E-03	0.14884184E+00	-0.77775098E-01
0.0	0.0	90.0	34.0	0.0	-0.61914331E-03	-0.63435116E-03	0.14888990E+00	-0.78255609E-01
0.0	0.0	90.0	36.0	0.0	-0.61334018E-03	-0.64090377E-03	0.14892356E+00	-0.78762256E-01
0.0	0.0	90.0	38.0	0.0	-0.60702616E-03	-0.64776430E-03	0.14894001E+00	-0.79294436E-01
0.0	0.0	90.0	40.0	0.0	-0.60017395E-03	-0.65487419E-03	0.14893626E+00	-0.79851680E-01
0.0	0.0	90.0	42.0	0.0	-0.59271388E-03	-0.66223106E-03	0.14890936E+00	-0.80433249E-01
0.0	0.0	90.0	44.0	0.0	-0.58461225E-03	-0.66975498E-03	0.14885639E+00	-0.81038497E-01
0.0	0.0	90.0	46.0	0.0	-0.57582365E-03	-0.67743950E-03	0.14877418E+00	-0.81666760E-01
0.0	0.0	90.0	48.0	0.0	-0.56629226E-03	-0.68521535E-03	0.14865957E+00	-0.82317233E-01
0.0	0.0	90.0	50.0	0.0	-0.55601296E-03	-0.69298683E-03	0.14850941E+00	-0.82989089E-01
0.0	0.0	90.0	52.0	0.0	-0.54490013E-03	-0.70073613E-03	0.14832081E+00	-0.83681613E-01
0.0	0.0	90.0	54.0	0.0	-0.53292635E-03	-0.70836471E-03	0.14809038E+00	-0.84393859E-01
0.0	0.0	90.0	56.0	0.0	-0.52006659E-03	-0.71578822E-03	0.14781521E+00	-0.85124999E-01
0.0	0.0	90.0	58.0	0.0	-0.50626975E-03	-0.72292623E-03	0.14749224E+00	-0.85873947E-01
0.0	0.0	90.0	60.0	0.0	-0.49149146E-03	-0.72968798E-03	0.14711854E+00	-0.86640045E-01
0.0	0.0	90.0	62.0	0.0	-0.47569210E-03	-0.73595543E-03	0.14669125E+00	-0.87421961E-01
0.0	0.0	90.0	64.0	0.0	-0.45885955E-03	-0.74164622E-03	0.14620772E+00	-0.88218853E-01
0.0	0.0	90.0	66.0	0.0	-0.44095944E-03	-0.74663182E-03	0.14566529E+00	-0.89029670E-01
0.0	0.0	90.0	68.0	0.0	-0.42196523E-03	-0.75083092E-03	0.14506164E+00	-0.89853309E-01
0.0	0.0	90.0	70.0	0.0	-0.40184110E-03	-0.75409177E-03	0.14439437E+00	-0.90688638E-01
0.0	0.0	90.0	72.0	0.0	-0.38055892E-03	-0.75628387E-03	0.14366162E+00	-0.91534540E-01
0.0	0.0	90.0	74.0	0.0	-0.35812336E-03	-0.75730868E-03	0.14286129E+00	-0.92389993E-01
0.0	0.0	90.0	76.0	0.0	-0.33453357E-03	-0.75703079E-03	0.14199191E+00	-0.93253702E-01
0.0	0.0	90.0	78.0	0.0	-0.30976208E-03	-0.75532217E-03	0.14105220E+00	-0.94124548E-01
0.0	0.0	90.0	80.0	0.0	-0.28380495E-03	-0.75209013E-03	0.14004101E+00	-0.95001385E-01
0.0	0.0	90.0	82.0	0.0	-0.25665481E-03	-0.74714469E-03	0.13895753E+00	-0.95883012E-01
0.0	0.0	90.0	84.0	0.0	-0.22833246E-03	-0.74044231E-03	0.13780129E+00	-0.96768245E-01
0.0	0.0	90.0	86.0	0.0	-0.19886157E-03	-0.73182693E-03	0.13657211E+00	-0.97655907E-01

0.0	0.0	90.0	88.0	0.0	-0.16823903E-03	-0.72119868E-03	0.13527010E+00	-0.98544762E-01
0.0	0.0	90.0	90.0	0.0	-0.13648965E-03	-0.70842711E-03	0.13389575E+00	-0.99433623E-01
0.0	0.0	90.0	92.0	0.0	-0.10363734E-03	-0.69345324E-03	0.13244995E+00	-0.10032137E+00
0.0	0.0	90.0	94.0	0.0	-0.69733847E-04	-0.67622412E-03	0.13093379E+00	-0.10120673E+00
0.0	0.0	90.0	96.0	0.0	-0.34793793E-04	-0.65656769E-03	0.12934899E+00	-0.10208867E+00
0.0	0.0	90.0	98.0	0.0	0.11124554E-05	-0.63448539E-03	0.12769735E+00	-0.10296606E+00
0.0	0.0	90.0	100.0	0.0	0.37960264E-04	-0.60993957E-03	0.12598115E+00	-0.10383757E+00
0.0	0.0	90.0	102.0	0.0	0.75708253E-04	-0.58292173E-03	0.12420305E+00	-0.10470232E+00
0.0	0.0	90.0	104.0	0.0	0.11426773E-03	-0.55329438E-03	0.12236611E+00	-0.10555900E+00
0.0	0.0	90.0	106.0	0.0	0.15356440E-03	-0.52118045E-03	0.12047370E+00	-0.10640670E+00
0.0	0.0	90.0	108.0	0.0	0.19357394E-03	-0.48652900E-03	0.11852947E+00	-0.10724430E+00
0.0	0.0	90.0	110.0	0.0	0.23417508E-03	-0.44937525E-03	0.11653754E+00	-0.10807078E+00
0.0	0.0	90.0	112.0	0.0	0.27531854E-03	-0.40980190E-03	0.11450238E+00	-0.10888510E+00
0.0	0.0	90.0	114.0	0.0	0.31688742E-03	-0.36783578E-03	0.11242859E+00	-0.10968632E+00
0.0	0.0	90.0	116.0	0.0	0.35883553E-03	-0.32364501E-03	0.11032134E+00	-0.11047358E+00
0.0	0.0	90.0	118.0	0.0	0.40103862E-03	-0.27720860E-03	0.10818577E+00	-0.11124583E+00
0.0	0.0	90.0	120.0	0.0	0.44341644E-03	-0.22876560E-03	0.10602753E+00	-0.11200222E+00
0.0	0.0	90.0	122.0	0.0	0.48585035E-03	-0.17838030E-03	0.10385247E+00	-0.11274195E+00
0.0	0.0	90.0	124.0	0.0	0.52826572E-03	-0.12628746E-03	0.10166653E+00	-0.11346414E+00
0.0	0.0	90.0	126.0	0.0	0.57052448E-03	-0.72617557E-04	0.99476017E-01	-0.11416803E+00
0.0	0.0	90.0	128.0	0.0	0.61254721E-03	-0.17590897E-04	0.97287327E-01	-0.11485276E+00
0.0	0.0	90.0	130.0	0.0	0.65421709E-03	0.38582570E-04	0.95106959E-01	-0.11551772E+00
0.0	0.0	90.0	132.0	0.0	0.69541187E-03	0.95657335E-04	0.92941537E-01	-0.11616208E+00
0.0	0.0	90.0	134.0	0.0	0.73603517E-03	0.15343448E-03	0.90797864E-01	-0.11678524E+00
0.0	0.0	90.0	136.0	0.0	0.77596697E-03	0.21159369E-03	0.88682637E-01	-0.11738651E+00
0.0	0.0	90.0	138.0	0.0	0.81508356E-03	0.26996015E-03	0.86602688E-01	-0.11796525E+00
0.0	0.0	90.0	140.0	0.0	0.85329922E-03	0.32818315E-03	0.84564812E-01	-0.11852106E+00
0.0	0.0	90.0	142.0	0.0	0.89048030E-03	0.38598030E-03	0.82575753E-01	-0.11905313E+00
0.0	0.0	90.0	144.0	0.0	0.92653692E-03	0.44310038E-03	0.80642089E-01	-0.11956100E+00
0.0	0.0	90.0	146.0	0.0	0.96134742E-03	0.49923931E-03	0.78770466E-01	-0.12004427E+00
0.0	0.0	90.0	148.0	0.0	0.99480874E-03	0.55413670E-03	0.76967232E-01	-0.12050241E+00
0.0	0.0	90.0	150.0	0.0	0.10268162E-02	0.60743623E-03	0.75238608E-01	-0.12093487E+00
0.0	0.0	90.0	152.0	0.0	0.10572787E-02	0.65892702E-03	0.73590666E-01	-0.12134134E+00
0.0	0.0	90.0	154.0	0.0	0.10861007E-02	0.70826494E-03	0.72029158E-01	-0.12172148E+00
0.0	0.0	90.0	156.0	0.0	0.11131780E-02	0.75520313E-03	0.70559621E-01	-0.12207481E+00
0.0	0.0	90.0	158.0	0.0	0.11384360E-02	0.79949800E-03	0.69187276E-01	-0.12240104E+00
0.0	0.0	90.0	160.0	0.0	0.11617850E-02	0.84088079E-03	0.67917071E-01	-0.12269979E+00
0.0	0.0	90.0	162.0	0.0	0.11831636E-02	0.87910175E-03	0.66753536E-01	-0.12297081E+00
0.0	0.0	90.0	164.0	0.0	0.12024849E-02	0.91396581E-03	0.65700948E-01	-0.12321393E+00
0.0	0.0	90.0	166.0	0.0	0.12196815E-02	0.94525458E-03	0.64763099E-01	-0.12342887E+00
0.0	0.0	90.0	168.0	0.0	0.12347115E-02	0.97280921E-03	0.63943423E-01	-0.12361538E+00
0.0	0.0	90.0	170.0	0.0	0.12475145E-02	0.99643518E-03	0.63244894E-01	-0.12377317E+00
0.0	0.0	90.0	172.0	0.0	0.12580475E-02	0.10160139E-02	0.62670097E-01	-0.12390242E+00
0.0	0.0	90.0	174.0	0.0	0.12662665E-02	0.10314290E-02	0.62221158E-01	-0.12400272E+00
0.0	0.0	90.0	176.0	0.0	0.12721502E-02	0.10425784E-02	0.61899677E-01	-0.12407399E+00
0.0	0.0	90.0	178.0	0.0	0.12756735E-02	0.10494122E-02	0.61706912E-01	-0.12411634E+00
0.0	0.0	90.0	180.0	0.0	0.12768172E-02	0.10518802E-02	0.61643537E-01	-0.12412959E+00