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THEORETICAL INVESTIGATION OF ONE-DIMENSIONAL FLAME PROPAGATION

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JOHN R. SELLARS

J. E. BROADWELL

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Since the contract was not returned to the University until June 15, no extensive work was undertaken until very recently.

The Agard Report, "Selected Combustion Problems," is being given intensive study especially with respect to determining the implications of the approximation introduced by Penner and von Kármán in the case of the time-dependent problem and whether similar simplification can be made there.

It is thought that general considerations of the time-dependent problem will throw light on the significance of the ignition temperature and "heat sink" concepts and show their limitation and advantages. It is felt that this work would be enhanced considerably if there could be found a simple mathematical model which contains the essential features of the problem and which can be solved exactly. Therefore, we are trying to find such a model, but it seems that the nonlinear features of such models as we have been able to devise always preclude an exact solution being found.

Some computations have been performed for us on the differential analyzer by a student. These computations were intended to reproduce Emmons' calculations for several cases. It was found that the extreme accuracy of the Mark IV Harvard computer was not necessary to get satisfactory results and a number of cases were quickly run off. It is expected that other examples of this sort will be considered from time to time to check the validity of certain approximations, since the answers are readily obtained.