

ICASE COLLOQUIUM

Langley Research Center

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10:30 a.m.
Building 1192C, Room 124

SUMMARY OF OBLIQUE DETONATION THEORY AND TOPICS FOR FUTURE RESEARCH

An oblique detonation, defined as an oblique shock accompanied by exothermic chemical reaction, has use as a benchmark for theoretical studies of multidimensional high-speed reacting flows. This seminar will summarize the speaker's recent theoretical studies of oblique detonations and suggest avenues for future inquiry. The summary will address Rankine-Hugoniot analysis, reaction zone structures for steady weak overdriven, weak underdriven, and strong oblique detonations, and comparisons between asymptotic and numerical solutions. As most flow fields of practical interest require a numerical solution, future theoretical studies should be directed towards providing a stronger foundation upon which to support numerical results. Some promising approaches which can be built around the existing oblique detonation theory include 1) further development of a thin airfoil theory for high speed reacting flows, 2) application of techniques such as center manifold theory to reduce the order of many degree of freedom kinetic equations, 3) examination of convergence of numerical methods to non-trivial reactive solutions and search for spurious solutions, and 4) study of simple reactive flows with resolved diffusion layers.

NASA employees attending this seminar should charge their time to Job Order A1980.