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Project Objective:

This project is directed toward obtaining a more fundamental understanding of mixing and chemical reaction in supersonic flows. The research effort comprises three inter-related elements: (1) an experimental study of mixing and combustion in a supersonic plane mixing layer; (2) development of laser-based diagnostics for high-speed flows; and, (3) simulations of compressible reacting flows.

Accomplishments:

Four doctoral students were supported, in part, by this grant. Two of these students were involved in the development of planar laser-induced fluorescence (PLIF) techniques for measurement of supersonic flow parameters. Two of the students were involved in the experimental studies of mixing and combustion in supersonic flows. Specific accomplishments include the development of a temporally-resolved two-dimensional velocity measurement technique based on PLIF of NO and the OH radical, measurement of the structure of supersonic reacting mixing layers, and investigation of mixing enhancement in non-reacting supersonic flows.

All students made satisfactory progress toward completing the requirements for the Ph.D. degree. Two students have completed their Ph.D. programs, and one student is nearing completion.

Publications:

The following publications, describing the work of the students, were published during the three-year period of this grant.


# ABSTRACT (Maximum 200 words)

Four doctoral students were supported, in part, by this grant. Two of these students were involved in the development of planar laser-induced fluorescence techniques for measurement of supersonic flow parameters. Two of the students were involved in the experimental studies of mixing and combustion in supersonic flows. Specific accomplishments included the development of a temporally-resolved two-dimensional velocity measurement technique based on planar laser-induced fluorescence of nitrous oxide and the hydroxyl radical, measurement of the structure of supersonic reacting mixing layers, and investigation of mixing enhancement in non-reacting supersonic flows.