

Proposal No. 07-2 T9.01-9975 - Hydroxyl Tagging Velocimetry for Rocket Plumes

PI: Thomas P. Jenkins
MetroLaser, Inc. – Irvine, CA

Identification and Significance of Innovation

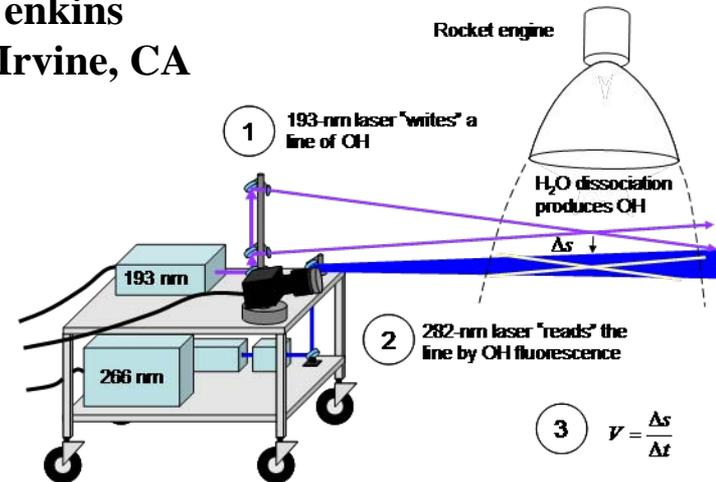
A laser-based velocity diagnostic for rocket plumes is proposed that is **1) non-intrusive, 2) does not require flow seeding, and 3) excels in hostile high temperature flows**. Hydroxyl tagging velocimetry (HTV) “writes” a line of OH molecules into the flow and interrogates them after a short delay to determine the velocity. The proposed diagnostic will provide measurements not obtainable by current methods, enabling experimental data for validating computer models that will greatly reduce development costs.

Expected TRL Range at the end of Contract: (6)

Technical Objectives and Work Plan

The specific objectives of this Phase II effort are:

1. Extend the analysis and experimental validation of OH tag lifetimes to include a wider range of operating conditions.
2. Experimentally characterize the OH excitation spectrum near 266 nm to enable a simpler, cheaper “read” laser (Nd:YAG).
3. Predict and verify performance of the optical detection system to establish accuracy vs. range, size, and cost.
4. Design and fabricate a working prototype system.
5. Demonstrate the prototype system with velocity measurements in a rocket engine exhaust.



NASA and Non-NASA Applications

NASA Applications: Validation of computer models for rocket engine performance, leading to improvements in efficiency and reduction in cost of hardware development programs.

Non-NASA Applications: Worldwide aerospace propulsion industry, rockets, missiles, scramjets, and turbine engines, new concepts in propulsion, pulse detonation engines, etc. Commercial applications include advanced turbofan development.

Firm Contacts

Thomas Jenkins, P.I. – MetroLaser, Inc. (949) 553-0688 x 269
Cecil Hess, President – MetroLaser, Inc. (949) 553-0688 x 223
Christina Arnold, Dir. Admin. - MetroLaser, Inc. (949) 553-0688 x241