PURDUE UNIVERSITY

Gelled Propellants Laboratory

HYPERGOLIC GEL PROPELLANT CHARACTERIZATION

Dedicated to small scale mixing, vaporization, and combustion of hypergols

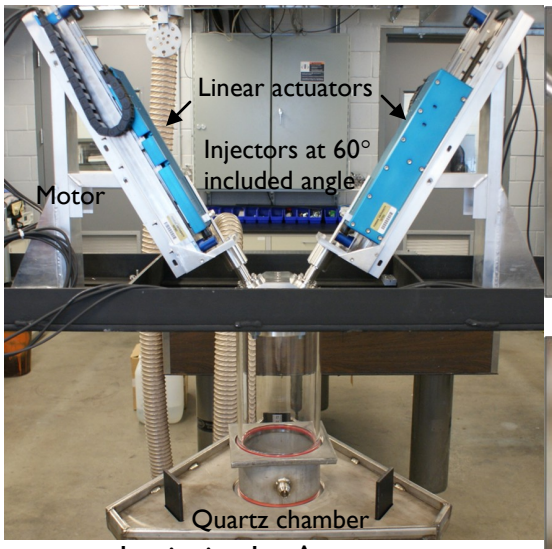
The Gelled Propellants Laboratory was developed at the Purdue University Maurice Zucrow laboratories to support experiments with hydrazine based fuels and oxidizers such as NTO. Designed in close collaboration with experts in the rocket propulsion industry as well as Purdue University fire protection engineers and industrial hygienists, the facility allows for small quantities (typically less than 100 ml) of hydrazine-based fuels and NTO-based oxidizers to be tested.

Recent experiments include:

- Drop size and temperature measurements under burning conditions
- Ignition and combustion experiments with electromechanically driven injection system in 360° optically accessible combustion chamber
- Viscosity measurements at rocket injection conditions
- Drop size and OH distribution measurement around MMH/air diffusion flame

MAJOR EQUIPMENT & CAPABILITIES

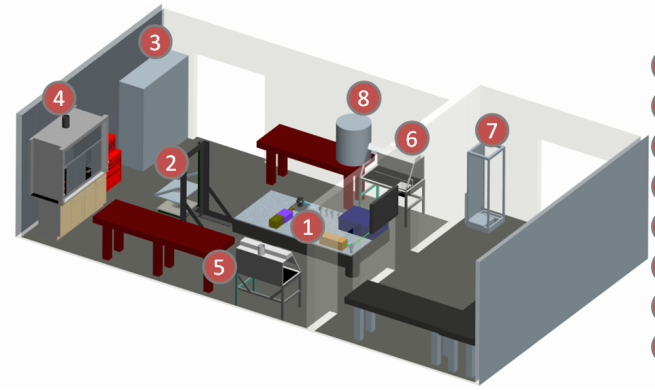
- 1300 CFM air ventilation and conditioning system with three fume hoods operating at 80 linear feet per minute and a portable canopy hood for propellant transfer
- Resodyn LABRAM mixer, 500 g mixing capacity
- 5kHz OH PLIF laser diagnostic capability
- Remote controlled combustion experiment with LABView based data acquisition and control
- MMH and NO_2 vapor analyzers (20 and 200 ppm)
- ATS Rheosystems Viscometer
- Capillary Rheometers for Reactive Gels (Fuel & Ox.), shear rate up to 10^6 s^{-1}
- Ignition/combustion setup with micro-second injection resolution

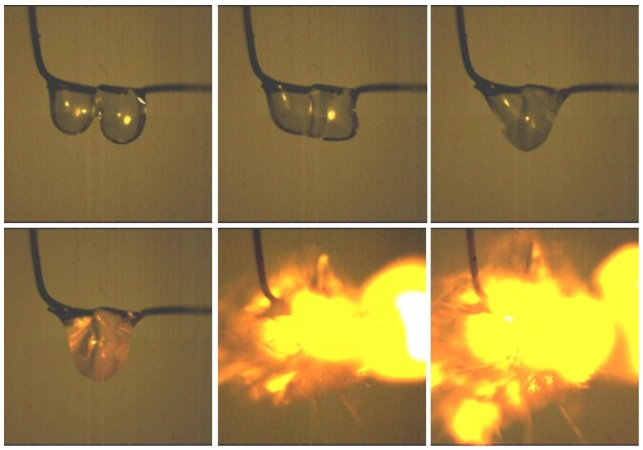


Impinging Jet Apparatus


MMH 6 wt.% Silica


RFNA 6 wt.% Silica





Fuel A/HP: In droplet contact experiment droplets of hydrogen peroxide 90% and fuel A (Triglyme with 12% $NaBH_4$). The ignition delay is 35.6 ms.

Prof. Timothée Pourpoint
timothee@purdue.edu
(765) 494-9423

Prof. William Anderson
wanderso@purdue.edu
(765) 496-2658

Prof. Steve Son
sson@purdue.edu
(765) 494-8208

Zucrow Laboratories
Purdue University / Chaffee Hall
500 Allison Road
West Lafayette, IN 47907
Phone: (765) 494-0370
Fax: (765) 496-6900

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