

Rarified Gas Flow Diagnostics

Research focuses on development of spatially-resolved spectroscopic tools to study the fluid dynamics and thermodynamics of rarefied gas flows in non-equilibrium. In particular, there is interest in rarified gas flows used in propulsion and attitude control of cube satellites (cubesats), such as in resistojet thrusters. Researchers at NRL are developing models to predict the efficiency of resistojet nozzles, and experimental data are needed to inform and validate these models. Measurements of interest include gas temperature, density, and velocity, and diagnostics of interest include Raman scattering spectroscopy, filtered and/or interferometric Rayleigh scattering, and laser-induced fluorescence (LIF). Labs are equipped with multiple spectrographs (including a holographic spectrograph), an electron-multiplied CCD (EM-CCD), multiple lasers, and supporting optics and instrumentation. Ideal candidates have an understanding of non-equilibrium gas dynamics and laser diagnostics so as to separately examine the internal modes of molecules and interpret their influence on the flow, though anyone with related optical-diagnostic experience is encouraged to apply. Full information about ongoing research in our section (Code 6185, Combustion & Reacting Transport) can be found at the following web address: <https://www.nrl.navy.mil/chemistry/research/6180/6185>.