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Development of a laser diagnostic using Raman and Thomson scattering in atmospheric microplasma sources[1] BRADLEY SOMMERS, STEVEN ADAMS, Air Force Research Laboratory — A laser scattering system utilizing a triple grating spectrometer and a 266 nm ultraviolet laser has been developed in order to investigate Rayleigh, Raman, and Thomson scattering within atmospheric plasma sources. Such laser scattering interactions offer a non-invasive technique for investigating atmospheric microplasma sources, which have potential applications in remote optical sensing, materials processing, and environmental decontamination. In this work, laser scattering measurements were performed on atmospheric discharges composed of nitrogen and air. The laser signal was calibrated using a heated nitrogen vacuum cell held at atmospheric pressure. Preliminary temperature measurements were performed on a D.C. microdischarge operating in normal glow mode. This provides a non-thermal plasma in which the translational, rotational, vibrational and electron temperatures are not in equilibrium. All gas temperatures were calculated by fitting simulated scattering spectra to the experimental data obtained using the triple grating spectrometer. Measured temperatures were also compared with those obtained using standard optical emission spectroscopy methods.

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