

Abstract Submitted
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Spectroscopic Study of Initial Stage of Pulsed DC Discharges in Noble Gases¹ VLADIMIR DEMIDOV, West Virginia University, JAMES WILLIAMSON, UES, Inc., STEVEN ADAMS, CHARLES DEJOSEPH, JR, JARED MILES, Air Force Research Laboratory — The relative intensities of spectral lines at 419.8 and 420.1 nm near the beginning of a pulsed dc glow discharge in Ar were measured by optical emission spectroscopy. The direct excitation cross-sections to the excited state energy level in the 3p manifold, 3p5 and 3p9 respectively, from ground state Ar atoms are very similar for the two transitions. However the 3p9 excited state level is also populated by and thus sensitive to the Ar metastable state density. Due to this, the intensity ratio of the two spectral lines can serve as a convenient probe of the relative metastable and electron densities in a discharge. Measurements of the spectral line intensity ratios, as a function of time, changes significantly near the beginning of the dc pulse. Depending on the reduced electric field, the fast growth of electron density can occur before or after the growth of metastable density. These spectral measurements can be used as a simple probe of the plasma species densities. Data will also be presented on similar investigations conducted in Ne and Xe.

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