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Transport properties of initially neutral gas disturbed by intense electron beam[1] JUSTIN ANGUS, STEVE SWANEKAMP, JOSEPH SCHUMER, DAVE MOSHER, PAUL OTTINGER, Plasma Physics Division Naval Research Laboratory — The behavior of intense electron beams (those with current densities on the order of hundreds of kA/cm^2 and beam rise times on the order of 100 ns) traveling through gaseous mediums depends strongly on the transport properties of the medium. For example, the conductivity of the medium, which is very sensitive to the ionization state and temperature of the gas, has a strong influence on the beam behavior through the plasma return current. Since the beam is responsible for ionizing and heating the gas, self-consistently solving for the gas transport properties and the beam propagation is essential for an accurate description of the system. An advanced gas chemistry model to describe the transport properties of a strongly disturbed gaseous system is presented in this work. A focal point of this work is an accurate description of the medium's conductivity as the gas progresses from its weakly ionized state, where swarm models are valid, to a strongly ionized state where the Spitzer-Harm model applies.

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