Axial Modeling of an Electric Discharge in Air HAROLD LADOUCEUR, ANDREW BARONAVSKI, TZVETELINA PETROVA[1], Naval Research Laboratory — An extensive collisional-radiative air-plasma model was developed to study the axial behavior of an electric discharge in a preexisting air plasma column. The model is based upon the numerical solution of the electron Boltzmann equation for the electron energy distribution function coupled with the balance equations of atomic and molecular ions under consideration, and various nitrogen and oxygen species in ground and excited states. The air kinetics model include both physical and chemical processes such as direct excitation and de-excitation, quenching with electrons and heavy particles, ionization, dissociation, attachment, detachment, recombination, charge exchange, and radiation. The local values of the applied electric field between the cathode of a 250 kV Van de Graaf generator and a grounded sphere have been taken from experiment and were used as an input parameter in solving the system of kinetics equations. The local values of the electron energy distribution function, electron density, mean energy, as well as the densities of all species under consideration were obtained as functions of the external imposed electric field.

Harold Ladouceur
Naval Research Laboratory

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