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Instability-driven ionization in a low-pressure helium discharge
T.P. HUGHES, M.M. HOPKINS, P.S. CROZIER, J.J. BOERNER, Sandia National Laboratories — We have carried out modeling of a plane-parallel low-pressure helium discharge with a thermionic cathode. Initially, ionization is due to direct-impact of cathode-emitted electrons on the neutral atoms. When a sufficient density of trapped electrons is established, a strong electron-plasma two-stream instability develops which heats the trapped electrons. The ionization rate is then enhanced by the hot electrons and by the collective fields of the instability. We present results showing the effect of neutral density and applied voltage on the V-I characteristics of the discharge.

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