

Abstract

In this work, we investigated the effect of gas heating near the electrode of an excimer lamp. Gas heating occurs in the cathode region as ions are accelerated by the high electric field near the cathode. The gas temperature profile was calculated by solving the one-dimensional heat transport equation in the Joule heating approximation without including the effect of reflected particles. The inter-electrode gap was filled with xenon gas and measured 0.5cm. The model predicts correctly the waveform of the temperature and illustrates the important role of the boundary conditions. The results obtained show clearly that the increase in the temperature in the sheath is limited by the increase in the ion current density in the cathode region due to the electron multiplication.

Keywords: Glow discharge; Heating effects; Excimer lamp; Xenon; Temperature