Kinetic Modeling of the IEC Device in Order to Predict the Number of Produced Ions

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An Inertial Electrostatic Confinement (IEC) is often referred to as a portable neutron source. This device can be used as a research reactor due to its simple structure and low cost. This device includes two electrodes and a feed-stalk. By using a power source, a voltage difference is applied between two electrodes, by means of a feed-stalk connected to the inner electrode. A lot of experimental and simulation research has been done all over the world. In this work, the IEC device is kinetically modeled using the particle-in-cell (PIC) method. This modeling has been done at a constant voltage of 25 kV and a normal pressure range (10^{-4} torr to 10^{-2} torr). According to the obtained results, the number of ions increases with decreasing pressure. At 10^{-2} torr pressure, the number of ions is equal to 1.03×10^{11}, while at 10^{-4} torr pressure, this value increases to 9.35×10^{12}. This increase in ions shows that the mean free distance increases with the decrease in pressure, and the probability of collision between ions and neutrals decreases.