Analytical Investigation of Potential Structure and Neutron Production Rate in Spherical Inertial Electrostatic Confinement Fusion Devices

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Abstract

Using deuterium fuel, the current study investigates the radial profile of potential structure and neutron production rate in spherical inertial electrostatic confinement fusion devices (IECF). With the introduction of ion and electron distribution functions and numerical solution of Poisson's equation, the potential is calculated. Using energy distribution function, the fusion reaction rate is computed. The dependence of the potential structure and the rate of neutron production on the spread of the energy and angular momentum, the number of secondary electrons generated from the cathode surface, input power and working pressure are evaluated. Results have shown that control of some of the parameters and variables can increase the rate of neutron production.

Keywords: Potential structure, Neutron production rate, Fusion, Spherical inertial electrostatic confinement.

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