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Numerical study on the Z pinch dynamics of gas jet type discharge produced plasma (DPP) source BIN HUANG, BIN XIE, TAKU TOMIZUKA, MASATO WATANABE, FENG XIAO, EIKI HOTTA, Tokyo Institute of Technology — Z pinch DPP source is often used as an Extreme Ultra-Violet (EUV) source. It is convenient to produce high temperature and high density plasma. There are several analytical models to describe the dynamics of the plasma. The snowplow model is a simple and widely used model to analyze the motion of the plasma shell and predict the pinch time; however, it is incapable of analyzing the plasma behavior after the maximum pinch and providing detailed information of concerned plasma parameters, such as electron density and electron temperature. In this study, we present the simulation results of the Z pinch DPP dynamics obtained by a 2D MHD code. This code solves the problem based on the assumption of single fluid, two temperature approximations in the cylindrical geometry. The numerical scheme for this MHD code is Total-Variation-Diminishing scheme in Lax Friedrich formulation (TVD-LF). The evolution of electron density, electron temperature, current density, magnetic flux and some other important parameters in Z pinch dynamics are investigated with this code. The simulation results show that the maximum pinch electron density is on the order of 10^{19} cm^{-3}, with a pinch plasma radius of about 0.1 mm. In order to optimize the radiation output, the influences of initial gas distribution and the current waveform on the Z pinch dynamics are also investigated. They affect the electron density at pinch stagnation obviously; while in term of electron temperature, the effect is slight.

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