SIMULATION OF THE CURRENT SHEATH DYNAMICS DURING AXIAL ACCELERATION PHASE IN A 600 J PLASMA FOCUS DEVICE

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Abstrak

Projek ini telah dirancang dan dijalankan untuk mensimulasikan dinamik lapisan arus elektrik dalam fasa pecutan paksi bawah dalam satu sistem plasma fokus. Perhitungan dilakukan berdasarkan parameter dari sebuah peranti plasma fokus 600 J yang digunakan di dalam Makmal Plasma Fokus, Jabatan Fizik, Universiti Malaya. Dinamik lapisan arus elektrik disimulasikan berdasarkan Model *Snow-plow* yang mana perhitungan dilakukan dengan menggunakan MS Excel. Perhitungan juga dilakukan dengan menggunakan sifat-sifat gas Argon dan juga julat tekanan gas di antara 9.0×10^{-3} mbar hingga 1.8×10^{-2} mbar. Hasil perhitungan kemudiannya dibandingkan dengan keputusan eksperimen yang sebenar. Satu faktor jisim dan faktor pengurangan arus elektrik juga ditambahkan ke dalam perhitungan supaya hasil perhitungan adalah berhampiran dan sesuai dengan keputusan eksperimen. Kelajuan lapisan arus elektrik menuruni paksi yang diperolehi adalah dalam julat 9.22 cm μs^{-1} dan 21.10 cm μs^{-1}.

Abstract

The project was designed to simulate the current sheath dynamics during the axial rundown phase in a plasma focus system. The computation was done by inputting parameters of a 600 J plasma focus device which is used in the Plasma Focus Laboratory, Physics Department, University of Malaya. The current sheath dynamics was simulated based on the Snow-plow Model which the calculation was done by using MS Excel. Argon gas was used and the operating pressure was varied. The computation was done having the parameter based on Argon gas with the pressures used in the experiments, which ranges from 9.0×10^{-3} mbar to 1.8×10^{-2} mbar. The computed results were compared to the experimental results. A mass factor and a current shedding factor are introduced in order to match the experimental observation. The axial rundown speed of the current sheath at different operating pressures is determined from the computed results, to be in the range of 9.22 cm μs^{-1} and 21.10 cm μs^{-1}.

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