ABSTRAK

Penyelidikan mengenai penghasilan bim elektron daripada Transient Hollow Cathode Discharge (THCD) dijalankan. Syarat-syarat seperti voltan pembekal, diameter hollow cathode dan tekanan yang berlainan telah dikaji. Penyerapan foil sinaran-X teknik digunakan untuk mengkaji taburan tenaga bim elektron dari sistem ini.

Dalam fasa pre-breakdown, pancaran sinaran-X adalah disebabkan oleh fenomena discas denyutan hollow cathode di mana bim elektron dihasilkan. Kewujudan bim elektron sudah dibukti dari simulasi taburan medan elektrik di mana simulasi ini dibuat berdasarkan geometri hollow cathode ini. Pancaran-pancaran sinaran-X dibandingkan dalam tekanan yang berlainan. Keamatan sinaran-X yang tertinggi didapati pada tekanan 1.5×10^{-2} mbar. Diameter hollow cathode yang lebih besar (5 mm) memberikan keamatan bim elektron yang lebih tinggi. Tenaga bim elektron didapati dari sinaran-X-sinaran-X dan mereka mempunyai nilai yang hampir sama dengan voltan dibekal.

ABSTRACT

The generation of electron beams in a Transient Hollow Cathode Discharge (THCD) is studied experimentally with respect to the variation of the charging voltage, diameter of the hollow cathode and pressure. The X-ray foil absorption technique is used to measure the energy distribution of the electron beam.

In the pre-breakdown phase, the X-ray emission is due to the pulsed hollow cathode discharge phenomenon which is closely associated to the occurrence of electron beam. The occurrence of the electron beam is evident from the simulation of electric field distribution based on the hollow cathode geometry. Comparison of the X-ray emission at various pressures show that the pre-breakdown electron beam intensity is optimum at a pressure of 1.5×10^{-2} mbar. The emission of the electron beam is enhanced when a bigger diameter of the hollow cathode is used (5 mm). The energy of the electron beam is deduced from the X-ray pulses and has a value close to the charging voltage.