

DESIGN OF SHEET BEAM ELECTRON GUN WITH PCM FOCUSING SYSTEM FOR G-BAND EIK

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ABSTRACT

In this paper, a sheet beam gun with Periodic Cusped Magnet (PCM) focusing is proposed, and the structural parameters of the sheet beam gun are designed and optimized to get desired beam current and beam size [1]. With the proper optimization, the sheet beam of cross section of $0.3\text{mm}\times 0.13\text{mm}$ was achieved with the compression factor of 4 and the beam voltage of 16.5kV and the current of 0.3A for the beam tunnel of $0.45\text{mm}\times 0.36\text{mm}$ [2]. According to the basic principle of Periodic Cusped Magnet field and the given basic structure, the size of magnetic steel and magnetization intensity are determined to obtain the desired axial magnetic induction intensity [3,4]. Then, the trajectory of the planar distributed beam in PCM focusing system was qualitatively analyzed by simulation. Meanwhile, we studied the effect of the initial position of the magnetic steel on the electron beam envelope and optimized the structure of the pole piece. Simulation results show that after proper optimization, a higher electron beam transmission rate of 97.88% can be obtained with the distance of 20mm.

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