The Engineering And Construction Of A Pre-Bunched Free Electron Maser

Abstract

We are developing prototype free electron maser (FEM) that is compact, tuneable and efficient for potential industrial use. Therefore we define the characteristics for the construction of a novel X-band rectangular waveguide pre-bunched free electron maser (PFEM). Our device operates at 10GHz and employs two rectangular waveguide cavities (one for velocity modulation and the other for energy extraction). The electron beam used in this experiment is produced by thermionic electron gun which can operate at 3kV and up to 5mA. The resonant cavity consists of a thin gap section of height 1.5mm which reduces the beam energy required for beam wave interaction. The prototype design, engineering and construction process are reported in this paper.