STUDY OF A 200GHz MICROKLYSTRON USING A PSEUDOSPARK-SOURCED ELECTRON BEAM

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In recent years much interest has been shown in radiation sources in the terahertz region (0.1 to 10THz) because of the demands in plasma diagnostics, radiotherapy, medical research and advanced communications. The Klystron is an ideal choice for THz generation due to its operation mechanism, efficiency and robustness as well as the fact that it may be scaled in size in order to achieve higher frequency operation[1]. Due to the decrease in size as the frequency is increased, there is a need for the electron beam current density to increase in order to achieve reasonable output powers. The pseudospark (PS) discharge is an ideal electron beam source because it can produce a suitable high current density and small diameter (<1mm) electron beam.

A 200 GHz microklystron was designed and simulated using the particle-in-cell (PIC) code MAGIC. MAGIC-2D results revealed a strong amplification signal as will be presented. Based on previous PS[2,3] experiments using a small-scaled single gap PS an 1mm diameter electron beam of 4 A at 6 kV was generated. This allowed the possibility to further scale down the PS into the micron range to drive a microklystron to be demonstrated. The fabrication of the designed microklystron will be achieved by using the process based on microelectromechanical systems (MEMS)[4].

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* Work supported by EPSRC UK