Abstracts

Electromagnetic Field Measurements on a Millimeter Wave Linear Accelerator

P.J. Matthews, T. Berenc, F. Schoenfeld, A.D. Feinerman, Y.W. Kang and R. Kustom. "Electromagnetic Field Measurements on a Millimeter Wave Linear Accelerator." 1996 Transactions on Microwave Theory and Techniques 44.8 (Aug. 1996 [T-MTT]): 1401-1409.

Perturbational field strength measurements suitable for use on a proposed 120-GHz 50-MeV electron linear accelerator are described. The measurements are used to determine the R/Q of the device, where R is the shunt impedance. The perturbation is achieved by the use of hollow metallic cylinders with diameters ranging from 25 to 127 µm which are approximately 500 µm long. The cylinders were fabricated by sputtering aluminum through a shadow mask onto silica optical fibers as well as nylon surgical thread. The perturbational "form factors" for such a geometry are experimentally determined using a pillbox cavity. The measured values for the form factors are compared to theoretical estimations, which result in simple analytical expressions. The measured form factors are also compared to values calculated from a finite difference model of the perturbing object. The R/Q for various accelerating modes is measured on a 12GHz model of the 120-GHz structure. Results are compared to predictions from a finite difference model of the accelerating structure.

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