

**EFFECTS OF BEAM VELOCITY SPREAD ON THE  
EXCITATION OF BACKWARD WAVES IN BEAM  
TUNNELS OF HIGH-POWER GYROTRONS**

J. Yu, T. M. Antonsen, Jr and G. S. Nusinovich  
*University of Maryland, College Park*  
*College Park, MD 20740, USA*

The excitation of backward waves in the beam tunnel of a high power gyrotron is considered. Such instability is believed to degrade beam quality and consequently gyrotron efficiency. The instability occurs in a region of the beam tunnel where both the magnetic field and beam tunnel radius are strong functions of axial position. The instability can be suppressed by coating the walls of the beam tunnel. Here we consider the effect of velocity spread and the coupling to electrostatic cyclotron waves on the conditions for BWO excitation. Results will be reported for beam tunnel parameters relevant to 170 GHz, MW class gyrotron for plasma heating.