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**Single Mode Excitation in High Power Gyrotrons** DMYTRO KASHYN, GREGORY NUSINOVICH, THOMAS ANTONSEN, IREAP, University of Maryland — Megawatt-class, millimeter-wave gyrotrons are necessary for plasma heating and current drive in large-scale tokomaks and stellarators. These gyrotrons operate at very high-order modes with rather dense spectrum of eigenfrequencies. Therefore, when the voltage rises from zero to its nominal value, self-excitation conditions can be fulfilled for several modes. Analysis of gyrotrons start-up scenarios was performed by many authors. It was shown that in gyrotrons with diode-type electron guns the excitation of at least one parasitic mode is inevitable during the start up. We propose a method of eliminating this excitation. The method is based on usage of the diode-type electron guns where transition from the space-charge to temperature-limited emission takes place at higher voltages. As a result, in the regions where the self-excitation can be fulfilled for parasitic modes, the current density is lower than the required starting value. Results include analysis of beam current densities for different gun configurations as well as the dependence of starting currents on the beam voltage.

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