The beam-wave interaction of K-band extended interaction oscillator

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The beam-wave interaction is the major physical process for generating high power microwave. In the extended interaction cavity, the external $Q (Q_{ex})$ is the major factor to affect the loaded $Q (Q_{L})$ when the unloaded $Q (Q_{o})$ is fixed. The output power is the maximized while the coupling parameter $\beta (Q_{o}/Q_{ex})$ is close to 1 ~ 2. The value of coupling parameter is normally determined by empirical data and lack of systematical studies. By using the particle-in-cell simulation, the hot test model can be built up and analyze the effect of wave coupling in a K-band extended interaction oscillator (EIO). This simulation model provides clear interaction results to explain the relation of field energy distribution of the extended interaction cavity. The study can provide a guideline for design the EIO.