Abstract Submitted
for the DPP16 Meeting of
The American Physical Society

Study on the After Cavity Interaction in a 140 GHz Gyrotron Using 3D CFDTD PIC Simulations M. C. LIN, Hanyang University, S. ILLY, K. AVRAMIDIS, M. THUMM, J. JELONNEK, Karlsruhe Institute of Technology — A computational study on after cavity interaction (ACI) in a 140 GHz gryotron for fusion research has been performed using a 3-D conformal finite-difference time-domain (CFDTD) particle-in-cell (PIC) method. The ACI, i.e. beam wave interaction in the non-linear uptaper after the cavity has attracted a lot of attention and been widely investigated in recent years. In a dynamic ACI, a TE mode is excited by the electron beam at the same frequency as in the cavity, and the same mode is also interacting with the spent electron beam at a different frequency in the non-linear uptaper after the cavity while in a static ACI, a mode interacts with the beam both at the cavity and at the uptaper, but at the same frequency. A previous study on the dynamic ACI on a 140 GHz gyrotron has concluded that more advanced numerical simulations such as particle-in-cell (PIC) modeling should be employed to study or confirm the dynamic ACI in addition to using trajectory codes. In this work, we use a 3-D full wave time domain simulation based on the CFDTD PIC method to include the rippled-wall launcher of the quasi-optical output coupler into the simulations which breaks the axial symmetry of the original model employing a symmetric one. A preliminary simulation result has confirmed the dynamic ACI effect in this 140 GHz gyrotron in good agreement with the former study. A realistic launcher will be included in the model for studying the dynamic ACI and compared with the homogenous one.

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Date submitted: 21 Jul 2016 Electronic form version 1.4