MICHELLE MODELLING OF THERMAL BEAMS IN KA-BAND DEVICES*

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Abstract: The effect of thermal velocities on beam formation and PPM focused beam transport, including cathode edge emission, are studied. MICHELLE simulations of a Ka-Band electron gun are presented that include a thermal beam emission model for a hot cathode, and these are compared to "cold" beam simulation results. Details of the MICHELLE thermal beam model are described, including an explanation of different options for configuring the model in the user interface, and which settings were used. The effects of thermal velocity spread on beam-wave interaction in a Ka-Band CC-TWT are discussed with applications to interaction code simulations. The coupled-cavity circuit design was obtained using 1D design codes CHRISTINE-CC [2] and CPI 1D CC-TWT code as well as 2.5D large-signal code TESLA-CC [3], a recent extension of the TESLA code. A comparison of thermal vs. non-thermal beam models is presented, including plots of current density and phase space. The detailed thermal beam modeling capability in MICHELLE is discussed, and an "optimal" set of thermal velocity distribution parameters is suggested

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