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Excitation of parasitic waves in forward-wave amplifiers with weak guiding fields¹ GREGORY NUSINOVICH, CARLOS ROMERO-TALAMAS, YONG HAN, THOMAS ANTONSEN, IREAP, University of Maryland, College Park — One of the issues critical for the development of high-power millimeter-wave amplifiers driven by electron beams is possible excitation of some parasitic oscillations. As a rule, the most dangerous are parasitic modes which can be excited at the ends of the passbands because such waves have low group velocities and, hence, can be strongly coupled to an electron beam. Excitation of parasitic waves near cutoff in forward-wave amplifiers was studied elsewhere [1] where the effect of the signal wave on the excitation conditions of such parasitic waves was analyzed. In Ref.1, it was assumed that electrons are guided by strong magnetic fields and, therefore, exhibit a 1D motion. In practice, it is often desirable to minimize the weight of the focusing systems, i.e. to operate in low focusing fields where electrons can exhibit 3D motion. This problem is analyzed in the present paper. Our study consists of two stages. First, we characterize the operation of a forward-wave amplifier in a weak magnetic field. This part of the study is a continuation of the work described in Ref.2. Next, we analyze the self-excitation of parasitic waves in the presence of forward waves and the effect of the signal wave on these excitation conditions.

[1] G. Nusinovich, O. Sinityn and T. Antonsen, Phys. Rev. E, **82**, 046404 (2010).

[2] T. M. Abu-elfadl, G. S. Nusinovich, A. G. Shkvarunets, Y. Carmel, T. M. Antonsen, Jr., and D. Goebel, Phys. Rev. E, **63**, 066501 (2001).

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Gregory Nusinovich
IREAP, University of Maryland, College Park

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