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Optimal Wakefield Excitation in Plasma by Non-resonant Train of Relativistic Electron Bunches

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Resonant wakefield excitation in two-beam electron-positron collider by a long train of relativistic electron bunches is difficult because it is difficult to support homogeneous and stationary plasma in experiment. In [1-5] the mechanism has been found of resonant plasma wakefield excitation by a nonresonant train of short electron bunches. The frequency synchronization results by defocusing of some bunches. In this material results are presented on 2.5D numeral simulation by 2d3v code LCODE [6] of resonant asymptote of wakefield excitation in plasma by nonresonant train of relativistic electron bunches. Under resonant asymptote we mean the excitation of the wakefield with the maximum growth rate, when the nonresonant train has already self-cleaned so that the interaction of the excited wakefield with the bunch electrons in the acceleration phases is negligible. Then the wakefield grows with steps. Optimum parameters are investigated at which the amplitude of the excited wakefield in the regime of resonant asymptote is the largest.

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