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Simulation of pre-bunched free electron laser oscillator in the THz regime

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Abstract

One of the long-term objectives in the development of high gain free electron lasers (FEL) is to reduce the necessary electron beam voltage for a strong FEL interaction at a given frequency. FEL oscillators (FELOs) play the main role to this end. In this paper, the simulation of one dimensional FELO with the planar wiggler is done at the applicable Tera-hertz regime. The effect of the pre-bunched electron beam on the gain improvement or on the laser length is investigated. To study the evolution of system, a set of self-consistent nonlinear differential equations are solved numerically by the Runge-Kutta method and the averaging of the electron beam is done by the Simpson method.

Keywords: free electron laser oscillator, one dimensional simulation, planar wiggler, energy and pre-bunching of beam

For full article, refer to the Persian section