

PULSE-SPLITTING IN SHORT WAVELENGTH SEEDED FREE ELECTRON LASER

M. Labat, M.-E. Couprie, SOLEIL, Gif-sur-Yvette, France
S. Bielawski, C. Sz waj, PhLAM/CERCLA, Villeneuve d'Ascq Cedex, France
C. Bruni, LAL, Orsay, France
N. Joly, University of Erlangen-Nuremberg, Erlangen-Nuremberg, Germany

Abstract

We investigate a dynamical behaviors occurring in single-pass free electron lasers (FELs), depending on the electron beam, undulator and seed laser parameters. We put in evidence a complex spatiotemporal deformation of the amplified pulse, leading ultimately to a pulse splitting effect with two sub-pulses. This phenomenon has been first observed in PERSEO simulations in the case of ARC-ENCIEL project studies, and then been analyzed more in details with the Colson-Bonifacio FEL equations. This studies reveal that slippage length as well as the seed laser pulse wings are the main ingredients of this dynamics. We show that the splitting results from the nonhomogeneous saturation of the gain by the optical field copropagating with the electron beam.

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