

EFFICIENCY AND SPECTRUM ENHANCEMENT IN A TAPERED FREE-ELECTRON LASER AMPLIFIER

X.J. Wang, D.A. Harder, J.B. Murphy, H.J. Qian,
Y. Shen, X. Yang, BNL, Upton, Long Island, New York;
H. Freund, W.H. Miner, SAIC, McLean

Abstract

We report the first experimental characterization of efficiency and spectrum enhancement in a laser-seeded free-electron laser (FEL) using a tapered undulator. Output and spectra in the fundamental and 3rd harmonic were measured versus distance for uniform and tapered undulators. With a 4% field taper over 3 m, a 300% (50%) increase in the fundamental (3rd harmonic) output was observed. A significant improvement in the spectra with the elimination of side-bands was observed for the first time using a tapered undulator. The experiment is in good agreement with predictions using the MEDUSA simulation code.

**CONTRIBUTION NOT
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