Abstract Submitted
for the DPP19 Meeting of
The American Physical Society

Comparison of Numerical Methods for the Calculation of Synchrotron Radiation From Electrons[1] CHENGKUN HUANG, F.Y. LI, R. GARIMELLA, P. POMBRIO, O. YEUNG, B.Q. SHEN, T. J. T. KWAN, B. E. CARLSTEN, Los Alamos National Laboratory — The coherent synchrotron emission of electrons in a beam bunch can lead to micro-instabilities causing emittance degradation and beam disruption detrimental to advanced light source development. To understand how the beam interacts with synchrotron radiation for a design and its optimization, accurate and efficient numerical methods are essential. We investigate several existing methods for the calculation of the radiation in near fields, including the finite difference method, the Lienard-Wiechert method and a near-field method recently validated [1]. We focus on the accuracy and efficiency of these methods in computing the radiation fields (coherent and incoherent) in both steady state and dynamical beam trajectories. In our presentation, we will also discuss a self-similarity feature in the synchrotron radiation that can be exploited to improve the calculations. [1] F. Y. Li, et al, paper MOPGW116, Proceedings of 10th Int. Particle Accelerator Conf., (2019).

[1]Work supported by the LDRD program at Los Alamos National Laboratory.

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Date submitted: 03 Jul 2019 Electronic form version 1.4