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A New Method of two-dimensional Calculation of Coherent Synchrotron Radiation in Relativistic Beams JINGYI TANG, Stanford Univ, GENNADY STUPAKOV, SLAC National Accelerator Laboratory — Coherent Synchrotron Radiation(CSR) is regarded as one of the main sources of emittance growth in the bunch compressor. Current simulations containing CSR wake fields often utilize one-dimensional model assuming a line beam. Despite its good computation efficiency, 1D CSR model can be inaccurate for beams of extreme high current like in FACET II. On the other hand, the existing 3D codes are often slow and have high demands on computational resources. In this paper we propose a new method for calculation of the two-dimensional CSR wakefields in relativistic beams with integrals of retarded potentials. It generalizes the 1D model and includes the transient effects at the entrance and the exit from the magnet. Within given magnetic lattice and initial beam distributions, the formalism reduces to 2D integration along the trajectory and therefore allows fast numerical calculations using 2D matrices.

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