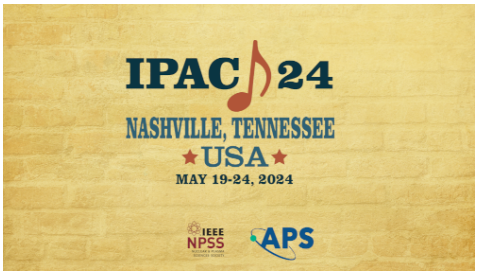

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A novel coherent synchrotron radiation simulation method using cavity Green's functions

Monday, 20 May 2024 16:00 (2 hours)

The mitigation of collective beam effects, in particular Coherent Synchrotron Radiation (CSR), is crucial for the development of particle accelerators with higher beam brightness. Among the strategies proposed in the literature, the use of appropriate shielding walls to curb CSR is an attractive strategy with many associated open problems. In particular, simulation methods that account for shielding effects usually employ image charges and assume free space potentials, making them only applicable for simple wall layouts. In this work, we will outline a novel simulation technique that makes use of cavity Green's functions to capture the field modes admitted by the shielding walls. In addition to better resolving the radiated fields, the proposed method will be robust to singularities that are typically encountered in the image charge approach. We will discuss the computational implications of using cavity Green's functions and discuss strategies to scale the method to complex geometries and large particle counts. The method will eventually be validated using results from a planned shielding study at the Argonne Wakefield Accelerator using a dipole chamber with variable gap size.

Footnotes

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