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Code for modelling synchrotron radiation in a waveguide

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We present a study that characterizes synchrotron radiation in the presence of a waveguide (the vacuum pipe). Building on previous work*, we have developed a code for calculating synchrotron radiation (SR) that accounts for boundary conditions. Our approach employs the Green's function technique to solve field equations under a paraxial approximation. We cross-checked the outputs of our code with the Synchrotron Radiation Workshop (SRW) in the free-space case and identified the sources of the observed differences. As a result, we offer a Python library for calculating synchrotron radiation with any given Green's function under specific boundary conditions. This tool will be used for field characterization and optimization of SR sources, especially in the THz and far-infrared ranges where the influence of vacuum components on radiation becomes significant.

Footnotes

*G. Geloni, E. Saldin, E. Schneidmiller, and M. Yurkov, Undulator Radiation in a Waveguide, Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment 584, 219 (2008).

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