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Simulating Partially Coherent Undulator Radiation with Gaussian Random Fields

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We propose a computationally efficient algorithm to calculate a single statistical realization of partially coherent synchrotron radiation fields at a given frequency. The proposed algorithm relies on a method for simulating Gaussian random fields. We cross-checked the algorithm's consistency with other well-established approaches, and, in addition, we show its advantage in terms of computational efficiency. The algorithm exploits the assumption of quasi-homogeneity of the source. However, we show that it is applicable with reasonable accuracy outside of this assumption. This algorithm can be extended to other types of sources that follow Gaussian statistics beyond the assumption of the quasi-homogeneity. Finally, the demonstration of the algorithm is well-suited for educational purposes.

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Footnotes

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Yes

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