Title

Update on the Application of the Adaptive Mesh Refinement Technique to Paritcle-In-Cell Simulations of Plasmas and Beams

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Update on the application of the Adaptive Mesh Refinement technique to Particle-In-Cell simulations of plasmas and beams

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The development of advanced accelerators often involves the modeling of systems that involve a wide range of scales in space and/or time, which can render such modeling extremely challenging. The Adaptive Mesh Refinement technique can be used to significantly reduce the requirements for computer memory and the number of operations. Its application to the modeling of beams and plasmas is especially challenging, due to issues that are specific to the Vlasov-Maxwell system of equations. In [1], we presented a summary of the main issues for electrostatic plasma simulations, their cures, and example applications; issues and a solution specific to electromagnetic plasma simulations were discussed in [2]. Novel algorithms [3,4] offer new perspectives that we are currently exploring [5,6] for the use of mesh refinement with electromagnetic plasma simulations. We will present our past and present work, and discuss its applicability and benefits to the design and understanding of advanced accelerators such as laser wakefield acceleration systems.

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