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The Lacuna Open Boundary Condition For Electromagnetics and Particle-in-Cell Simulation of Plasmas ERIC WOLF, Michigan State University, ANDREW GREENWOOD, Air Force Research Laboratory, ANDREW CHRISTLIEB, Michigan State University — In many typical situations in computational electromagnetics (CEM), a finite computational domain must be truncated with a boundary condition (called an absorbing boundary condition or open boundary condition, among other names) that allows outgoing waves to exit with minimal spurious reflection. One highly successful such boundary condition is the perfectly matched layer (PML), introduced by Berenger in 1994 and refined by others in subsequent years, which provides for minimal reflection at an acceptable computational cost. One difficulty in the use of PML is the need to tune several parameters to suit any given problem. Another open boundary condition is the lacuna open boundary condition (LOBC), pioneered by Ryaben'kii, Tsynkov and others, which makes use of the presence of lacunae, still regions where all waves have left and will no longer return, in solutions to wave equations in odd dimensions with compactly supported sources. We examine the use of the LOBC as a means of truncating Finite Difference Time Domain (FDTD) meshes in electromagnetic simulations and particle-in-cell simulations of plasmas, and compare to PML in terms of spurious reflections, computational cost and ease of use.

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