Particle Emission and Absorption in Cut Cell Geometries of Electromagnetic Particle-in-Cell (PIC) Codes[1] SUDHAKAR MAHALINGAM, CHET NIETER, JOHN LOVERICH, DAVID SMITHE, MING-CHIEH LIN, Tech-X Corporation, Boulder, Colorado 80303 — Cut cell techniques are frequently used in FDTD (Finite Difference Time Domain) electromagnetics algorithms to better represent complex geometries and achieve improved accuracy. Recent research at Tech-X has been performed to investigate the use of particle emitters and absorbers in complex cut cell geometries. Key issues are the preservation of Gauss's law at the emission and absorption points in electromagnetic simulations without using divergence cleaning techniques such as Hodge projection. Several methods have been developed to properly preserve Gauss's law during emission and absorption from cut cell boundaries and are presented in this work. In addition, results are presented for a variety of complex configurations. Ultimately the research will be applied to beamed energy devices.

Sudhakar Mahalingam
Tech-X Corporation, Boulder, Colorado 80303

Date submitted: 08 Sep 2008   Electronic form version 1.4