An implicit time domain meshless formulation for Maxwell's PDEs

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A meshless particle approach based on an unconditionally stable time-domain method devoted to electromagnetic transient simulations, is presented. Maxwell's PDEs are solved by using a set of particles, arbitrarily placed in the problem domain [1]. An heavy limit in applying meshless formulation is usually in making use of an explicit finite difference scheme accounted for time stepping. In fact, as well as in the time domain grid schemes, the CFL-like relations strongly condition the performance of the numerical algorithm. In this paper, the meshless particle method is approached with an unconditionally stable time stepping scheme. A leapfrog alternating directions implicit finite difference algorithm [2] is taken into account. The computational tool is assessed and simulation results are discussed in order to validate the proposed approach.

References

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[2] S. J. Cooke, M. Botton, T. M. Antonsen, B. Levush, *A leapfrog formulation of the 3-D ADI-FDTD algorithm*, International Journal of Numerical Modelling: Electronic Networks, Devices and Fields, 22 (2009), pp. 187-200.