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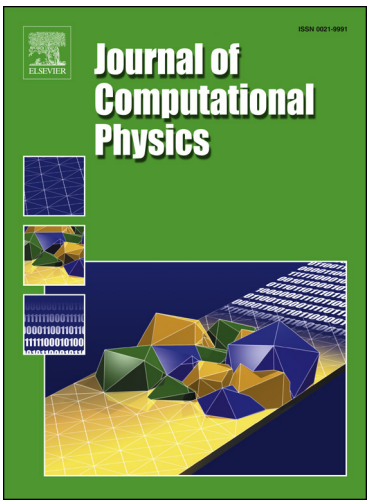

Computational Electrodynamics in Material Media with Constraint-Preservation, Multidimensional Riemann Solvers and Sub-Cell Resolution – Part I, Second-Order FVTD Schemes

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Highlights

- From the FDTD method, we retain a spatial staggering strategy for the primal variables. This provides a beneficial constraint preservation for the electric displacement and magnetic induction vector fields.
- We use the multi-dimensionally upwinded Riemann solvers developed by the first author.
- We use the ADER predictor step to endow our method with sub-cell resolving capabilities so that the method can be stiffly stable and resolve significant sub-cell variation in the material properties within a zone.