数学与系统科学研究院

计算数学所学术报告

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报告题目：

On a dispersively accurate solver for 3D Maxwell's equations in non-staggered grids

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报告地点： 科技综合楼三层 **311**

计算数学所报告厅

Abstract:

An explicit finite-difference scheme for solving the three-dimensional Maxwell's equations in non-staggered grids is proposed in time domain. The development aim is to solve the Faraday's and Ampere's equations within the discrete zero-divergence context for the electric and magnetic fields (or Gauss's law). The local conservation laws in Maxwell's equations are also numerically preserved all the time using the explicit second-order accurate symplectic partitioned Runge-Kutta temporal scheme. Following the method of lines, the spatial derivative terms in the semi-discretized Faraday's and Ampere's equations are then properly discretized to get a dispersively very accurate numerical performance. This proposed fourth-order accurate space centered scheme minimizes the difference between the exact and numerical phase velocities. The significant dispersion and anisotropy errors manifest normally in finite difference time domain method are therefore much reduced. In addition to the fundamental study performed on the proposed scheme, the dual-preserving (symplecticity and dispersion relation equation) wave solver is numerically demonstrated to be efficient for use to get long-term accurate Maxwell's solutions.

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