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基于移位算子方法的通用介质CFS-PML实现

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摘要：

针对通用色散介质时域有限差分方法计算时完全匹配层吸收边界截断的问题，提出了一种新颖的复频率完全匹配层实现方法。该方法从拉伸坐标系的麦克斯韦旋度方程出发，首先利用移位算子方法得到拉伸坐标张量系数的移位算子表示式，进而得到完全匹配层的时域有限差分更新公式。该公式与计算区域内的介质无关，可用于通用介质情况。数值计算结果表明，所得吸收边界在内存占用、计算时间、应用场合等方面均表现出色，且推导简单，概念明确。

关键词： 色散介质 时域有限差分方法 移位算子 复频率参数完全匹配层

Shift operator scheme applied to CFS-PML for general medium

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Abstract:

A novel implementation of shift operator to complex frequency shifted perfectly matched layer (CFS-PML) is presented for the truncation of finite-difference time-domain lattices. The CFS-PML formulation based on stretched coordinate Maxwell curl equations is deduced and combined with the shifted operator method, which is referred to as SO-PML that is completely independent of the host medium and may be applied to general medium. Computation examples demonstrate its efficiency and feasibility. In addition, the proposed SO-PML is easily understood in concept and implemented in programming.

Keywords: dispersive media finite difference time domain (FDTD) method shift operator complex frequency shift perfectly matched layer (CFS-PML)

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