

# An alternating direction implicit method for acoustic waves and microscale heat transfer

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## Abstract

Some accurate and efficient numerical methods are discussed for solving acoustic wave and microscale heat transfer equations. A three-level, second-order implicit algorithm is considered without introducing auxiliary variables. As a perturbation of the algorithm, an alternating direction implicit (ADI) procedure which has a splitting error not larger than the truncation error is suggested in order to solve problems of diagonal diffusion tensors in cubic domains efficiently. An error analysis is provided for the numerical solutions. Some numerical results are presented to show the accuracy and efficiency of the new algorithms for viscous and nonviscous waves. Further applications of the ADI method are also discussed.