

Finite Element Heterogeneous Multiscale Method (FE-HMM) for the wave equation

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(joint work with A. ABDULLE and M. J. GROTE)

The simulation of time dependent waves propagating through a medium with rapidly varying propagation speed can be prohibitively expensive with a standard finite element (FE) approach, because it requires a resolution down to the finest scales of the medium. We propose a FE-scheme for solving the wave equation numerically within the framework of heterogeneous multiscale methods (HMM), as introduced by E and Engquist [5], which overcomes these problems. We adapt the method described by Abdulle [1,3] to the time dependent wave equation and derive optimal error estimates. Numerical experiments in periodic and non-periodic heterogeneous media in one and two space dimensions illustrate the usefulness of our approach.

References

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