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**GLOBAL MULTISCALE FINITE METHODS FOR ACOUSTIC
WAVE EQUATIONS WITH CONTINUUM SPATIAL SCALES**

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We explore multiscale approaches for solving wave equations with heterogeneous coefficients. Our interest comes from geophysics applications and we assume that there is no scale separation with respect to spatial variables. To compute the solution of these multiscale problems on a coarse grid, we define global fields such that the solution smoothly depends on these fields. We present various multiscale finite element discretization techniques and provide analysis of these methods. A few representative numerical examples are presented using heterogeneous fields with strong non-local features. These numerical results demonstrate that the solution can be captured more accurately on the coarse grid when some type of limited global information is utilized.

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