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University of Maryland, Baltimore County, 1000 Hilltop Circle, Baltimore, MD 21250. *Multiscale  
methods for seismic imaging.*

Scientists and engineers who wish to understand the earth's subsurface are faced with a daunting challenge. Features of interest range from the microscale (centimeters) to the macroscale (hundreds of kilometers). It is unlikely that computational power limitations will ever allow routine modeling of this level of detail. Numerical upscaling is one technique intended to reduce this computational burden. I will discuss a two-scale algorithm for solution of the wave equation. The upscaling technique relies on decomposing the solution space into coarse and fine components. Step one involves solving for fine-grid features internal to coarse blocks. In step two we augment the coarse-scale problem via this internal subgrid information. I will discuss convergence of the forward algorithm for acoustics. I will conclude with a discussion of how one might efficiently calculate the adjoint for the upscaling algorithm so that it can be used as a forward model for inversion. (Received September 22, 2011)