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**Dispersion and attenuation due to scattering from heterogeneities
in the frame bulk and shear moduli of sand sediments**

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Previously, we presented the results of applying perturbation theory to the problem of fast compressional wave propagation through a Biot medium with heterogeneities in the frame bulk modulus (B. T. Hefner et al, *J. Acoust. Soc. Am.* v.119, 3447 (2006)). It was found that the heterogeneities scattered energy into both the slow and fast compressional waves, thus increasing the attenuation of the fast compressional wave. This theory has since been generalized to account for heterogeneities in both the frame bulk and shear moduli. For the fast compressional wave, energy is now scattered into the shear wave as well as the fast and slow compressional waves, further increasing the attenuation of the coherent field. While shear wave propagation is unaffected by variations in the frame bulk modulus, scattering does occur when there are heterogeneities in the shear modulus. Energy in the shear wave is scattered into both shear and compressional waves as well. The generalized theory depends on the autocorrelation functions of both the shear and bulk moduli variations as well as the cross-correlation function between the moduli. Efforts are underway to estimate these statistics in simple random packings of spherical grains using discrete-element modeling. [Work supported by ONR.]