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**Numerical investigation of ultrasound attenuation through trabecular bone** PHILIPPE GUYENNE, ROBERT GILBERT, Univ of Delaware — A composite viscoelastic model for ultrasound propagation through trabecular bone in the time domain is proposed. The trabecular matrix of cancellous bone is described as an isotropic viscoelastic material, while the interstitial fluid is modeled by Stokes flow. Realistic 2D bone samples with complicated microstructure are reconstructed from CT-scanned images of real human calcaneus and from random distributions of fluid-solid particles generated by the turning bands method. Direct numerical simulations of the acoustic propagation equations are performed based on an accurate staggered-grid finite-difference scheme. Motivated by laboratory experiments, ultrasound attenuation through trabecular bone is examined as a function of excitation frequency and bone porosity. Comparison is made with homogenization results on various elastic properties. This model allows us to assess in detail the role of bone microstructure in ultrasound attenuation. In view are medical applications to the recovery of bone parameters for the assessment of bone quality and for the early detection of such diseases as osteoporosis by quantitative ultrasound techniques.

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