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Hua Chen* (chenhua@udel.edu), Ewing 108, Department of Mathematical Sciences, University of Delaware, Newark, DE 19706, and **Robert P Gilbert** and **Philippe Guyenne**. *A Biot model for the determination of material parameters of cancellous bone from acoustic measurements.*

A numerical investigation is presented for the feasibility of determining material parameters of cancellous bone by acoustic interrogation in two dimensions. A mathematical formulation is proposed for the *in vitro* experiment where a bone sample is immersed in a rectangular water tank. Modified Biot's equations for cancellous bone are coupled with a boundary integral equation for the water pressure. Cancellous bone is described as an isotropic and homogeneous medium with constant material parameters. An explicit expression for the Green's function is derived in the form of a double series. Well-posedness is established for a variational formulation of this nonlocal boundary value problem. Sensitivity and recovery tests are performed for frequencies in the ultrasonic range, and the results show that such parameters as bone porosity can be determined with reasonable accuracy. The inversion procedure is based on direct minimization of an objective function involving the pressure field measured at locations near the bone sample. (Received September 24, 2018)