1077-35-579 **Robert P Gilbert*** (gilbert@math.udel.edu), 317 Ewing Hall, University of Delaware, Newark, DE 19716, **Alexander Panchenko** (panchenko@math.wsu.edu), Pullman, WA 99164, and **Ana Vasilic** (vasilic021@gmail.com), Abu Dhabi. *Acoustic Propagation in a Random Saturated Medium: The Biphasic Case.*

Osteoporosis is characterized by a decrease in strength of the bone matrix. Since the loss of bone density and the destruction of the bone microstructure is most evident in osteoporosis cancellous bone, it is natural to consider developing accurate ultrasound models for the isonification of cancellous bone. We develop an effective model of acoustic wave propagation in a two-phase, non-periodic medium modeling a fine mixture of linear elastic solid and a viscous Newtonian fluid. Bone tissue is an important example of a composite material that can be modeled in this fashion. We extend known homogenization results for periodic geometries to the case a stationary random, scale-separated microstructure. The ratio ε of the macroscopic length scale and a typical size of the microstructural inhomogeneity is a small parameter of the problem. We employ stochastic two-scale convergence in the mean to pass to the limit $\varepsilon \to 0$ in the governing equations. The effective model is a biphasic phase viscoelastic material with long time history dependence. (Received September 07, 2011)