1067-74-1549 **Robert J Ronkese*** (rjronkese@gmail.com), Dept of Mathematical Sciences, United States Military Academy, West Point, NY 10996. *Asymptotic Models of the Nonlinear Adaptive Orthotropic Elastic Rod and Plate.*

Cancellous bone can be viewed as a lattice of asymptotically thin rods and plates. It is assumed that cancellous bone has at least orthotropic symmetries and the planes of orthotropic symmetry coincide with the fabric tensor. van Rietbergen et al. found that errors in the stress-strain calculation when using the orthotropic stiffness matrix instead of the full matrix amounts to a few percent or less. Cowan and Yang used a spectral decomposition method to and the average eigenbasis of stiffness matrices. They found that a set of human cancellous bone specimens had orthotropic symmetry at a 95% confidence level.

Considering the above, the orthotropic elastic rod and plate will be used in a model of bone remodeling first proposed by Cowin in the late 1970s. In each geometry, scalings will transform the stress and strain tensors in the original domains of the rod and of the plate into their scaled counterparts in enlarged domains. Simplifications will be made in he asymptotic expansions of the tensors and the displacement vector. The results will be used in ODEs governing the rate of bone growth and reabsorption whose formulations depend upon the geometry of the domain used. Results of numerical simulations will be presented. (Received September 21, 2010)