COMPUTATIONAL BONE REMODELLING REVISITED

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Abstract. Bone as a living material is able to adapt to loading by changing its density and trabeculae architecture. This process is referred to as remodelling. In this talk, a computational model that accounts for bone remodelling is presented, whereby novelties from the viewpoint of biomechanical modelling are the incorporation of material uncertainties, life-time aging and availability of nutritive substances. The physical process of remodelling is modelled using continuum scale, open system thermodynamics whereby the density of bone evolves isotropically in response to the loading it experiences. The fully-nonlinear continuum theory is approximately solved using the finite element method. It is validated using a series of benchmark problems.