Rouhi, Gholamreza; **Herzog, Walter**; **Sudak, Les**; **Firoozbakhsh, Keikhosrow**; **Epstein, Marcelo**

Free surface density instead of volume fraction in the bone remodeling equation: theoretical considerations. (English) Zbl 1200.74110

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Summary: We propose a new set of constitutive equations for bone remodeling that uses the specific surface instead of volume fraction. The theory of small-strain adaptive elasticity proposed by Cowin and Hegedus and a surface remodeling equation are derived to develop the remodeling theory. A relationship between net bone cell activity, bone material property and mechanical stimuli is derived. For illustration, the rate of change of trabecular remodeling is derived for selected geometries. With this model, the effect of bone micro-structure and mechanical stimuli on the rate of remodeling can be studied.

MSC:

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Keywords:

remodeling; adaptive elasticity; small strain