

Rouhi, Gholamreza; Epstein, Marcelo; Sudak, Leszek; Herzog, Walter
Free surface density and microdamage in the bone remodeling equation: theoretical considerations. (English) [Zbl 1213.74227](#)
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Summary: Bone is maintained through a coupled process of bone resorption and bone formation, in a continuous process called bone remodeling. An imbalance in this process caused by disease, abnormal mechanical demands, or fatigue may predispose bone to fracture injuries. The remodeling process is generally viewed as a material response to functional demands. Here, we propose a new set of constitutive equations for the bone remodeling process and contains the specific surface, instead of volume fraction, and the degree of microcracking in the constitutive equations. The rate of remodeling is related to mechanical stimuli, free surface density and a microcrack factor. In this approach, the effect of mechanical stimuli, rate of mechanical stimuli, and integration of mechanical stimuli on bone remodeling can be evaluated simultaneously in the remodeling equation. Specific examples are given for illustration of the model.

MSC:

74L15 Biomechanical solid mechanics
92C50 Medical applications (general)

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bone remodeling; free surface; microcracks; elasticity

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