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Fracture analysis for biological materials with an expanded cohesive zone model

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Abstract - In this study, a theoretical framework for simulation of fracture of bone and bone-like materials is provided. An expanded cohesive zone model with thermodynamically consistent framework has been proposed and used to investigate the crack growth resistance of bone and bone-like materials. The reversible elastic deformation, irreversible plastic deformation caused by large deformation of soft protein matrix, and damage evidenced by the material separation and crack nucleation in the cohesive zone, were all taken into account in the model. Furthermore, the key mechanisms in deformation of biocomposites consisting of mineral platelets and protein interfacial layers were incorporated in the fracture process zone in this model,

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