

Fracture Mechanics and Micro Crack Detection in Bone: A Short Communication

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Abstract

The crack propagation is a critical stage in fatigue failure of bone. The effect of osteoporosis in human bone and how it influences on triggers and deterioration in trabecular bone are a major health problem and concern, e.g. in sternotomy and implant surgery. These considerations have increased in order to investigate the crack initiation, propagation, direction and microstructures. By investigating the bone microstructure using computer tomography (Micro-CT-image) and applying automated image analysis methods, computer simulation models can be established allowing to investigate multiple crack initiation and propagation in trabecular bone structures.

Bone with low tissue density (osteoporosis), bone tumors, and certain cancers, or a brittle bone disease called osteogenesis imperfect are at higher risk for bone fractures. Therefore, the diagnoses of the loss in bone mass (bone density) and the changing in bone microstructures that accompanying with aging have to be in focus. Further on, with the help of numerical simulation models and fracture mechanics approaches the interaction of bone and implant systems can be studied in detail. In a longer perspective optimization of surgery and medical treatment could be imagined.