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Crack propagation in bone on the scale of mineralized collagen fibrils: role of polymers with sacrificial bonds and hidden length

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ABSTRACT

Jang and Kim [1] and Boyle and Kim [2] have already shown that the trabecular structure of human proximal femur can be closely approximated through topology optimization. In similar fashion, we employed a topology optimization scheme to create the trabecular structure in human vertebrae. We also expanded the scope to include animals in which the normal posture places the spine in the horizontal position, dramatically altering the load pattern. Thus, we were able to examine the effects of differing load conditions on the trabecular structure.