

Volume Manipulations for Simulating Bone and Joint Surgery

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摘要

Abstract

Bone and joint surgery is widely used in orthopedic, oral, and maxillofacial, and dental and plastic departments to correct bone and joint pathology such as bone and joint tumors and fractures, and skeletal morphological deformities. This article presents a voxel structure to represent topologically and geometrically correct surfaces and algorithms to accurately compute intersections of tool swept surfaces with bones based on this voxel structure. This article then presents various volume manipulation algorithms to operate on virtual bones, bone grafts, and prostheses for bone and joint surgery simulations. A complicated knee arthroplasty illustrates the practicality and versatility of the proposed method.