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Application of CT-Image Based Finite Element Method to Orthopaedic Biomechanics Problems

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MINI-SYMPOSIUM PROPOSAL

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Computed tomography (CT) images have successfully used in orthopedics to analyze structures of bones and joints. CT images have 2D information of bone shape with gradation of CT values corresponding to distribution of bone mineral density (BMD). It is therefore possible to construct 3D bone and joint models with BMD distribution using the image processing technology. Such 3D computational models are then able to be converted into finite element models, and mechanical analysis can be performed. This procedure is recently called 'CT-image based finite element method (CT-FEM)' and has effectively been applied to analyze and solve orthopaedic mechanical problems. Thus, CT-FEM has been one of the most important techniques in the computational biomechanics field of orthopaedics.

The aim of this mini-symposium is mainly to discuss the current research trend and progress of application of the technique on different types of orthopaedic biomechanics problems. The topics presented here may include the mechanical interaction, called 'stress-shielding', between bones and implants such as artificial joints, bone fixing plates and screws, bone fractures such as femoral neck fracture and compressive vertebral fracture associated with osteoporosis. Fundamental theories for bone biomechanics and key technologies for CT-image processing may also be discussed in this symposium.

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