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PATIENT SPECIFIC SIMULATION OF THE HUMAN PROXIMAL FEMUR

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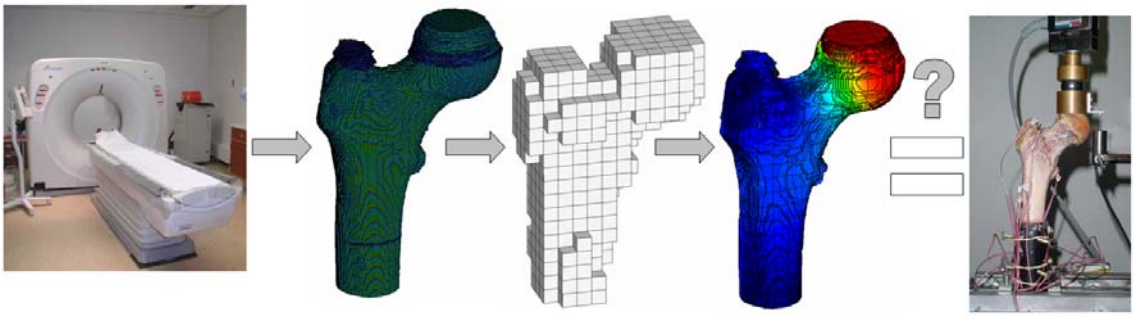
ABSTRACT

We present a generalization of the recently proposed Finite Cell Method (FCM) [2,3,4], which combines ideas from embedding or fictitious domain methods with high-order finite elements [1]. Besides supporting a fast and simple generation of meshes it also provides high convergence rates. The basic idea is an extension of a partial differential equation beyond the physical domain up to the boundaries of an embedding domain, which can easier be meshed. We will demonstrate how the FCM can be applied to support a fast and reliable patient specific simulation of the human proximal femur. To this end, the FCM is extended to be able to automatically derive and analyse patient specific data based on quantitative computed tomography (QCT). The method is validated on experimental data provided by Yosibash et al. [5]. Special emphasis will be placed on topics like the fast analysis, control of the discretization error by hierarchic extension procedures and the incorporation of isotropic and (if time allows) anisotropic material laws.



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