Meshless Methods and particle methods advances in biomechanics

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Key words: Meshless Methods, Particle Methods, Computational Biomechanics

ABSTRACT

This mini-symposium intends to present and discuss recent applications in biomechanical and biomedical engineering using meshless methods and particle methods.

Over the past twenty years, meshless methods and particle methods became one of the major interest subjects in computational mechanics. Since then several meshfree numerical approaches were developed and applied to various fields of computational mechanics, and as expected only the most stable and accurate prevailed. Nowadays meshless methods, using approximation or interpolation functions, collocations techniques and particle methods are used by the scientific community to solve several engineering problems, from fluid mechanics to biomechanics. The capability of handling efficiently large deformations of the computational mesh and the re-meshing low computational cost explain the variety of scientific fields covered by meshless techniques. Recently, the scientific community started to realize the potential that these meshfree numerical approaches represent in the biomechanical field. Today it is possible to find in the literature several works related with the application of meshless methods or particle methods in biomechanics, such the simulation of biologic fluid flow, the interaction between biologic fluids and solids (organs or prostheses), the crack tip propagation modelling in biomechanical tissues (hard and soft tissues), the soft or hard biological tissue remodelling processes, the biomechanical multi-scale modelling, the straightforward image-based methodology in biomechanics, among many others. All these subjects are included in the mini-symposium topics.

This mini-symposium aims to attract meshfree researchers from various fields with the objective to exchange ideas and identify challenges and advantages in this important numerical field.