

DEVELOPING A PROPER BIOMECHANICAL COMPUTATIONAL MODEL

E. MORALES-ORCAJO^{*†}, J. BAYOD^{*}, E. BARBOSA DE LAS CASAS[†]

^{*} Group of Structural Mechanics and Materials Modeling (GEMM). Aragon Institute of Engineering Research (I3A). University of Zaragoza, Zaragoza, Spain. Biomedical Research Networking Center in Bioengineering, Biomaterials and Nanomedicine (CIBER-BBN), Spain. (enriquem@unizar.es)

[†] Group of Biomechanics Engineering UFMG (MecBio). School of Engineering, Federal University of Minas Gerais, Belo Horizonte, MG, Brazil.

Key words: Computational simulation, Biomechanical modeling, Tissue properties, Finite element analysis.

ABSTRACT

The development of a biomechanical computational model is a challenging process where principles of different fields are used to simulate the complexity of the human body. For this reason, it is not possible to achieve a suitable computational model without a basis in fields such as computational simulation, medical image, mechanical tissue properties and numerical methods. This talk will present a brief introduction in such fields oriented to the development of proper biomechanical computational models. The main issues to cover will be:

- Initial considerations, addressing the problem, aim and scope.
- Geometry and data collection, medical image and volume generation.
- Mechanical tissue properties, experimental tests and numerical approaches.
- Meshing process, types of mesh and mesh quality.
- Pre and post calculus, boundaries and common software.
- Validation and result reporting.

A variety of examples of real cases using latest technologies in recent studies will be provided to illustrate the discussion topic.