

MSc-project

Title: Finite element modeling of the biomechanics in the human heart

Description:

Cardiovascular diseases are the number one killer worldwide, and thus it is of high interest to develop diagnostic methods to help deepening the understanding and ease the follow-up for patients with heart related diseases. To do so, it is important to provide a “ground-truth” case which can be used for development and validation of these methods. Finite element models are suited for this. So, what we would like to investigate in this project is an advanced representation of constitutive relations for the myocardium, and its implementation in a suitable finite element software. Furthermore, the model must be tested and validated. The origin of the motion of the myocardium is based on dynamic CT scans of normal human hearts without known pathologies.

Things to investigate:

- Representation of the anisotropic nature of the myocardium.
- Implementation of user-specific constitutive relations in a dedicated finite element software.
- Model performance study and validation.

Required qualifications: This project comprises elements of fluid mechanics, structural mechanics and image processing. The student(s) should have experience with Matlab and Comsol Multiphysics. The courses 31529 Tissue and Movement Biomechanics and/or 31545 Medical Imaging Systems can be an advantage.

Responsible institution: DTU Elektro

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Allowed no of students per report: 1-2

DTU supervisor: Marie Sand Traberg