

The Chair of Applied Dynamics offers the following project or master thesis topic:

Moldelling a surface-based fluid cavity of a rat left ventricle using finite element method

Heart disease is considered as the primary cause of death in the world. Human heart research is often carried out on rat hearts due to their similar structure and functions as well as ethical issues. Most diseases are directly related to the ventricle functions since the muscles of the left ventricle autonomously contract to pump oxygenated blood into the rat body during a beating cycle. However, understanding and modelling the ventricle functions is a challenging topic since the relationship between the ventricle contraction and the blood pressure and volume in the ventricle chamber are highly complicated. Specifically, the relation between the blood pressure and the volume is caused by a change of the ventricle contraction or deformation. To investigate this relation, a simulation model is required. Basically, this work can be done by using a surface-based fluid cavity approach in a finite element setting in Abaqus. To validate the proposed model, simulation results such as the pressure-volume relation can be compared with experiments performed by our cooperation partners at the Universitätsklinikum Erlangen. Consequently, modeling the solid-fluid interaction, its implementation into Abaqus as well as its verification and validation are the main tasks of this research. This topic is conducted at the Chair of Applied Dynamics under the supervision of Dr. Minh Tuan Duong.

Qualification

- Students studying computational engineering, engineering, mathematics, physics, informatics
- Basic programming skills (in Fortran, Python desirable)
- Basic knowledge on matrices (or tensors desirable)

If you are interested, please email minh.tuan.duong@fau.de.