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Kolloquium für Mechanik

Referee: **Dr. Oscar Flores**
Dept. Bioengineering and Aerospace Engineering
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Date: Thursday, February 7, 2019, 15:45h
Location: Bldg. 10.81, HS 62 (R 153)

Title: **Numerical simulation of cardiac flows: blood stasis in the left atrium**

Abstract

Atrial fibrillation (AF) is one of the most important public health problems and a significant cause of health care costs in western countries. It is estimated that by 2030, there will be 15 million patients with AF in Europe, with 150000 new cases per year. Patients with AF are at high risk of developing left atrial (LA) thrombosis, particularly in the LA appendage (LAA), leading to an increased risk of thromboembolism (i.e., 5x higher risk of stroke). The reason is thought to be related to the changes in the flow of blood and its residence time in diseased hearts. However, the risk of stroke in clinical practice is assessed using general population factors, disregarding geometric or kinematic parameters of the heart.

This highlights the importance of patient specific tools, like the computational framework for the analysis of the LA hemodynamics presented in this talk. This framework is the result of a collaboration between researchers of three different institutions (UC3M, University of California San Diego and the Hospital Gregorio Marañon at Madrid, Spain), including engineers, radiologists and physicians. The developed framework combines x-ray computed tomography scans, 0D models of the pulmonary circulation and mass conservation to provide boundary conditions for a simulation performed with the immersed boundary method. In this talk, after presenting the numerical framework in some detail, results of simulations for N=6 patients (including one with AF) will be analyzed and discussed, to assess the relationship between the residence time in the LAA and kinematic and geometric parameters of the heart.

Alle Interessenten sind herzlich eingeladen.
Prof. Dr.-Ing. Markus Uhlmann