

Dr. Simone Deparis

Mathematics Institute of Computational Science and Engineering - MATHICSE

SEMINAR OF NUMERICAL ANALYSIS

➤ **THURSDAY 24 NOVEMBER 2011 - ROOM CM1 100 - 16h15**

Dr. Tim Kaufmann, (Dr. rer. medic. Dipl.-Phys. Department of Cardiovascular Engineering, RWTH Aachen University, Aix-la-Chappelle / DE) will present a seminar intitlled:

"Developing assist devices for cardiovascular diseases – from idea to clinical use"

Abstract:

Cardiovascular diseases are the number one killer in developed countries, and the need for research in this field is clearly evident. In the Department of Cardiovascular Engineering (CVE) of RWTH Aachen University, cardiac assist devices have been developed from idea to clinical use for many years.

This presentation provides an overview of current and recent CVE-projects in the field of Cardiac Assist and Replacement, Lung Assist, Valve Replacement and Applied Research. Special focus will be on how to apply numerical simulation to assist the development process.

The first part of the presentation will provide insight in the development and optimization process of medical devices such as rotary blood pumps (RBP), total artificial hearts (TAH), oxygenators, heart-lung-machines (cardiopulmonary bypass – CPB) and heart valves, as well as prototyping and experimental methods for analysis of these devices.

In the second part, the use of numerical simulations in device development of the aforementioned sections will be presented. For Cardiac Assist and Replacement, this includes numerical analysis of RBP with focus on hemolysis and fluid-structure-interaction (FSI) simulations of TAH. In terms of Lung Assist, numerical simulation of oxygenators and mathematical modeling of gas exchange rates and their experimental validation will be discussed. For Heart Valves, emphasis will be structural analysis of stents, FSI simulations of heart valves and thrombogenesis, and Applied Research will be represented by simulations of blood flow in the cardiovascular system for physiological and CPB conditions.

Lausanne, 15 November, 2011/AQ/JB/cr

The seminars taking place at the Section of Mathematics are announced on internet address : [www
http://mathicse.epfl.ch/seminars](http://mathicse.epfl.ch/seminars)