

Essen, 03.11.08

## **Seminar Mechanik und Numerische Mathematik**

**Prof. Dr. Daniel Rixen**

T.U. Delft, Faculty 3mE, Engineering Dynamics

### **„Microsystems: new challenges for multiphysical modeling“**

Microsystems (also called Micro Mechanical Systems, or MEMS) are very small structures made with technologies hired from electronic chip manufacturing. They start to be everywhere: in cars for sensing its motion, in medical implants to measure pressures. Such structures based on microtechnique technology are used to filter beer, as tunable antenna in your mobile phone, to entertain you with your WII or to construct satellites of a couple of kilograms. Microsystems are also the enabling technology for nano-systems: micro-systems are the tools to manipulate and process nano-structures.

At the micro-level surface forces generated by electrostatics or fluid interaction become dominant compared to volumic forces significant at the macro-level (e.g. gravity). To design accurate and efficient MEMS strong physical interaction between structures, electrostatics, thermics, piezo, micro-fluidics ... needs to be properly simulated. For the last 8 years our group has been investigate now numerical techniques to build accurate and efficient models for MEMS. In our presentation we will discuss the variational formulation used to build monolithic approaches for strong electromechanical coupling. This has led to novel Finite Elements and later eXtended Finite Elements (XFEM) have been investigated to render to modeling of moving structures in an electric field more efficient and versatile. We will also discuss special solution techniques to solve the corresponding non-linear strongly coupled problem. If time allows we will also present the current work on model reduction of the thermo-mechanical coupling in MEMS.

**Ort:** Universität Duisburg-Essen, Campus Essen, **Raum T03 R03 D26**

**Zeit:** Freitag, den 28.11.2008 von 12.00 Uhr bis 13.00 Uhr

**gez. Prof. Dr. A. Klawonn**

**gez. Prof. Dr.-Ing. J. Schröder**