

Design and Modelling of MEMS Sensors and Actuators

Course Details

Event acronym: TULMEMS

Event name: Design and Modelling of MEMS Sensors and Actuators

Event type: Course

Number of hours or days: 2 days

Planned date: January 24-25 2005

Frequency: One-time event, but may be repeated depending on demand

Venue: Lodz - Poland

Target audience: University teaching staff, PhD. students, engineers from the industry

Teaching aids: Slides, printed tutorial handbook

Prerequisites (expected knowledge and experience of participants): basic knowledge on microelectronics, in particular on MEMS and Microsystems; basic skills in layout design

Character of the event: International, open

Expected fee: Free of charge for REASON partners, 10 EURO for other participants

Are travel grants available? No

Are lunches provided? No

Language of the event: English

Number of participants: Minimum 6 expected 10

Brief Course Programme

The course concerns design and modelling of MEMS devices, with emphasis on mechanical sensors and actuators.

1st day (January 24)

Design of bulk- and surface-micromachined MEMS sensors and actuators using CADENCE environment.

9:00 – 12:00 Theoretical lectures (including one coffee break):

- Introduction to MEMS
- Frontside and backside bulk micromachining based on anisotropic wet etching
- Design examples: thermopile-based temperature sensor, pressure sensor, bulk-micromachined piezoresistive accelerometer
- Bulk micromachining based on reactive ion etching
- Surface micromachining
- Design examples: capacitive accelerometer, micromirror, comb-shaped resonator
- CMOS-compatible MEMS processes

12:00 – 18:00 Practical exercises in the lab* (including lunch break and coffee breaks):

- Exercise 1: A bulk-micromachined thermopile-based temperature sensor
- Exercise 2: A surface-micromachined accelerometer and/or resonator

2nd day (January 25)

Modelling of surface-micromachined mechanical sensors and actuators.

9:00 – 11:00 Theoretical lectures (including one coffee break)

- Introduction to multi-dimensional mechanical models of MEMS devices
- Introduction to simulation environments: ANSYS and CFD-ACE+
- Steady-state and modal analysis of microstructures in vacuum
- Multi-domain coupled-field fluid-mechanical transient simulations taking gas damping into account
- Sequential vs. direct field coupling
- Extracting mechanical frequency response from 3-D simulation results
- Reduced mechanical models

11:00 – 16:00 Practical exercises in the lab* (including lunch break)

- Exercise: Steady-state and modal mechanical analysis of a surfacemicromachined accelerometer with ANSYS

*The labs will be carried out on PC workstations.

Important Notice

Please note that the number of participants is limited to 10. The REASON participants will have the priority if the number of requests exceeds the maximum number of course participants.

Contact People

Course information

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Venue & accommodation

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For more information and latest news visit the course web page <http://www.mixdes.org/MEMScourse>