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Teaching with CHEMKIN

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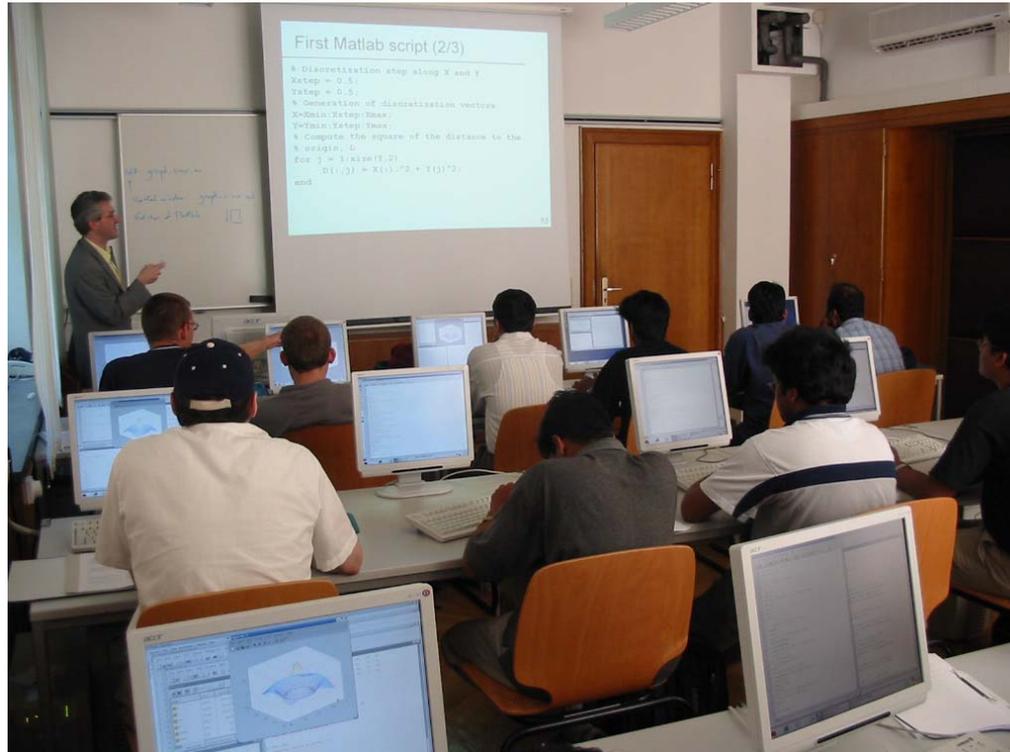
Lab. of Fluid Dynamics and Technical Flows

<http://www.uni-magdeburg.de/isut/LSS>



Introduction

- No experience, **only projects for the future**, hopefully starting beginning of 2005. At present time CHEMKIN only used for research/Ph.D.s. on a case-by-case basis (no central formation).
- CHEMKIN III already installed as a classroom-license on a Linux PC-Cluster with 16 workplaces



Who is concerned?

- 2 different aspects, both at **graduate level**:
 - ➔ lecture on "Combustion Technology", the most important lecture that would **use CHEMKIN regularly** during the semester
 - ➔ lecture on "Advanced Fluid Mechanics": **introduction to CHEMKIN** (demo, 1 hour) when dealing with reacting flows
- First one is clearly the most important one, 2nd neglected...
- "Combustion Technology": second/third semester of Master or *Hauptdiplom*, students would use CHEMKIN-III on hands-on:
 - ➔ **compulsory** lecture (in German) for students of "Security and Hazard Prevention" (about 30 Master students/y.)
 - ➔ **elected** lecture (in German or English) for students of Chemical and Process Engineering (either M. Sci. or Dipl.-Ing., together about 100 students total/y.)

Use of CHEMKIN III

- Mainly for illustration purposes
- Students would be directly in contact with several concepts through the CHEMKIN hands-on:
 - ➔ multi-species mixtures: at the beginning a discovery for most students, who only know pure fluids or at most global reactions. Including considerations of thermodynamics, diffusion of species,...
 - ➔ multi-step reaction processes: how chemical transformations really happen, importance of radicals,...
 - ➔ equilibrium composition (EQUIL), also used to illustrate stoichiometric conditions
 - ➔ premixed flame (PREMIX): structure and flame speed
 - ➔ ... [to be decided]

Advantages/Problems

➤ Only **expectations**, not experience!

➤ Advantages:

➔ through a direct contact (hands-on), better, faster and deeper understanding of concepts

➔ for those who later on choose a PhD, basics of CHEKMIN already known...

➤ Problems:

➔ at least one hour needed for a minimum usage of CHEMKIN by the students

➔ clearly restricted to a "black-box" usage. All input files must be ready to use beforehand and working...

➔ convergence problems are not allowed, since they do not appear clearly for inexperienced users