

Lecturer: **Prof. Manuel Torrilhon**, Rogowski 332 (mt@mathcces.rwth-aachen.de)

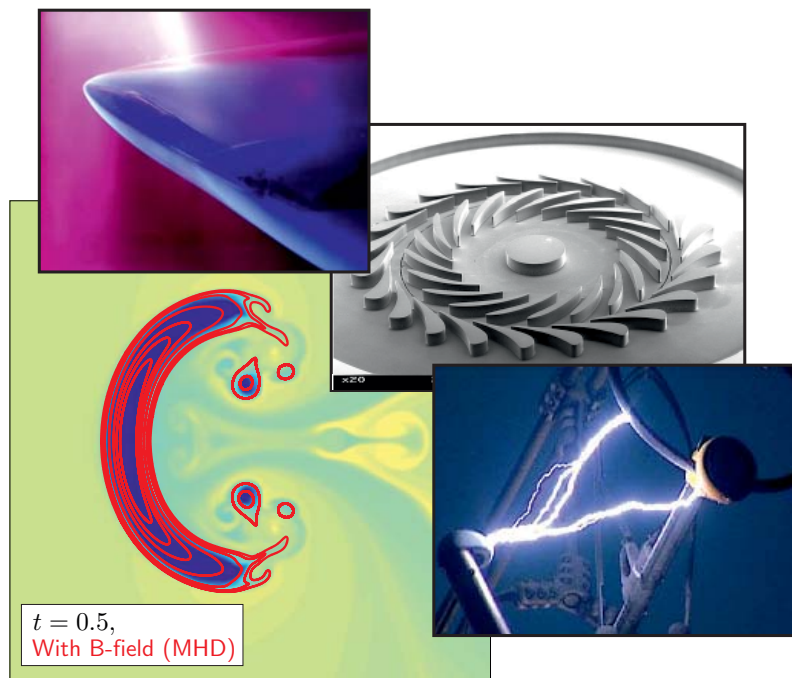
Target Audience: **Mathematics/CES students**

Format: **3 VL + 1 UE** (first meeting Tuesday 11:45, Rogowski 328)

## Class: **Introduction to Modeling with PDEs**

- process-description by partial differential equations
  - balance laws as fundamental principle

$$\frac{d}{dt} \int_{\Omega} U(\mathbf{x}, t) d\mathbf{x} = \oint_{\partial\Omega} \mathcal{F}[U(\mathbf{x}, t)] d\mathbf{A} + \int_{\Omega} \mathcal{P}[U(\mathbf{x}, t)] d\mathbf{x}$$



- constitutive theories of solid and fluid mechanics, electro- and thermodynamics, including magnetohydrodynamics
- entropy conditions for materials, micro-macro-transitions, asymptotic expansions, ...
- shock waves, earthquakes, flames, electric arcs, micro-flows, ...