

## DFG Research Center MATHEON Mathematics for key technologies

### MATHEON Multiscale Seminar\*

organised by R. Klein (FU), K. Schmidt (TU), and B. Wagner (TU)

TU Berlin, MA 313, **Wednesday, April 23th 2014**, 4.00 pm

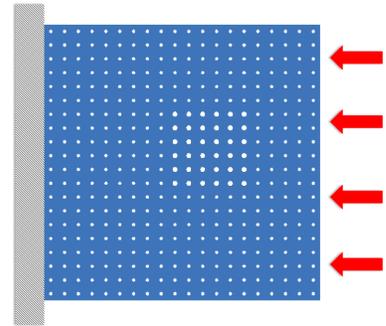
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Alfonso Caiazzo (WIAS, 4.00 pm)

#### **Multiscale modeling of weakly compressible elastic materials in harmonic regime**

This talk focuses on the modeling of elastic materials composed by an incompressible elastic matrix and small compressible gaseous inclusions, under a time harmonic excitation. In a biomedical context, this model describes the dynamics of a biological tissue (e.g. liver) when wave analysis methods (such as Magnetic Resonance Elastography) are used to estimate tissue properties. Due to the multiscale nature of the problem, direct numerical simulations are prohibitive.

First, we extend to the time harmonic regime a recently proposed homogenized model [Baffico et al. SIAM MMS, 2008] which describes the solid-gas mixture as a compressible material in terms of an effective elasticity tensor. As next, we derive and validate numerically analytical approximations for the effective elastic coefficients in terms of macroscopic parameters only. This simplified description is used to set up an inverse problem for the estimation of the tissue porosity, using the mechanical response to external harmonic excitations.



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— Coffee break (Matheon Lounge, MA 315) —

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Antonin Novotny (University of Toulon, France, 5.00 pm)

#### **Discrete relative entropy and error estimates for some finite volume/finite element schemes to compressible Navier-Stokes equations**

We will talk about several issues related to the notions of weak solutions, dissipative solutions and stability properties to the compressible Navier-Stokes system aiming applications in the error analysis of some numerical approximations to these equations.

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\* The MATHEON Multiscale Seminar takes place approximately three times per term with one or two talks about recent work on partial differential equations with multiple scales. Please contact one of the organisers if you want to be invited by e-mail or if you would like to contribute a talk.

Webpage: <http://www.tu-berlin.de/?multiscale-seminar>