



SIAM SC seminář

**jednou měsíčně v úterý od 15.40
v seminární místnosti KNM (4.patro)**

Co to je? Seminář určený studentům vyšších ročníků a všem zájemcům o pravidelné setkávání nad problémy aplikované matematiky. Setkejte se jednou za měsíc s kolegy a zjistěte, co je v oboru nového.

Proč přijít? Přinášíme pestrou škálu témat a přednášky jsou uzpůsobeny neoborníkům s cílem zprostředkovat základní orientaci v různých oblastech aplikované matematiky -- je jen na vás, jak s ní dále naložíte.

Nejbližší seminář: 13.3.2018

A Gentle Introduction to (Persistent) Homology

Rami Luisto

One of the great mathematical achievements of the previous century was the development of Homology Theory. One useful application of this theory was that it gives rise to new topological invariants which are often effective in showing that two spaces are not homeomorphic. Despite vast usefulness, homology theory and more generally the field of algebraic topology is somewhat infamous due to its abstract nature. Indeed, the definitions are often given through category theory, which is known as 'abstract nonsense' even by mathematicians!

In this talk I aim to describe some aspects of homology theory as concretely as possible with no previous knowledge of the topics assumed. Along the way I will describe how the theorem yields proofs for some classical theorems, e.g. why the plane is not homeomorphic to the three-dimensional space. Time permitting, I will also show some cool pictures related to something called persistent homology. This is a modern (from the turn of the century) method widely used in data analysis in which the shape of the data is studied via computational homology.

Aspects of Stability for Fluids Described by Non-Monotone Constitutive Relation

Adam Janečka

First, we introduce (implicit) non-monotone constitutive relations for incompressible fluids that connect the symmetric part of the velocity gradient and the deviatoric part of the Cauchy stress. Then we discuss the stability of such constitutive relations by means of the gradient dynamics and provide a possible explanation of the experimentally observed hysteresis. We also address the topic of linearized hydrodynamic stability and review the numerically determined spectra of the corresponding simple shear flows. Finally, we show some results from the simulations of an unsteady cylindrical Couette flow of fluids described by non-monotone constitutive relations.

