Chapter Highlights

Charles University in Prague Chapter of SIAM

June 9, 2015

Workshop on FEniCS Project[1]

In February 2015 the Charles University in Prague Chapter of SIAM organized a week-long workshop focused on programming in the FEniCS Project. The FEniCS Project is a collection of free software with an extensive list of features for automated and efficient solution of partial differential equations. Among the main components of this tool there are the C++/Python problem solving environment DOLFIN and the the Unified Form Language (UFL) that allows a user-friendly and almost mathematical formulation of the problem.

The workshop started off with solving the Laplace equation which was used to teach participants the basics of Python and provide them with a brief introduction to the FEniCS. We used our previous experience from MATLAB workshops that learning by doing is the most appreciated approach by attendants. Later in the week we moved from one problem to another and solved the heat equation, the evolutionary nonlinear problems of the incompressible Navier-Stokes equation, and the equations of hyper-elasticity. In the end we spent the last day on computing the eigenfunctions of the Laplace operator.

The course was led by two members of our faculty, Jaroslav Hron and Jan Blechta who is one of the developers of the FEniCS Project. The workshop attracted 30 participants, students and faculty staff members. We consider it to be a great success with possibility of becoming one of the regular activities of our Chapter.

[1]this text was published on SIAM Student blog on March 25, 2015

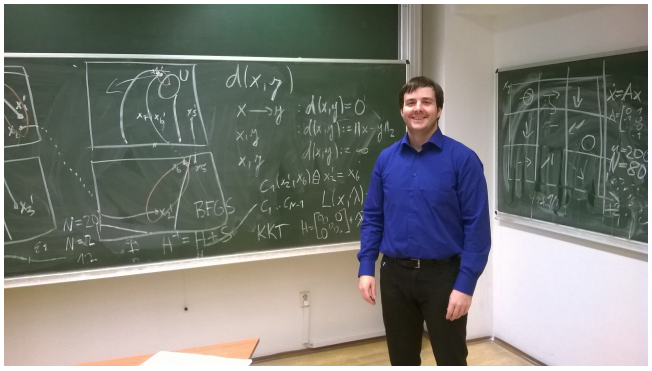
Meeting with Alumni – Martin Myšička

It is a good tradition to invite Alumni of our faculty and give an opportunity for students to ask about their life and work. This year our invitation was accepted by Martin Myšička. Although he studied physics at our faculty he later pursued a career of an actor in a theatre. These days he is well known and awarded actor. For that very reason the main topic of discussion was not research or industry related.

Martin spoke about his student life at the faculty and about his studies. He recalled what was it like to be a student before the Velvet revolution in 1989 and shared a funny story. He said he had been actually invited to a demonstration that had preceded the change of regime. He did not go because he had a backpack on his back already and went home instead thinking that this was yet another demonstration that nobody would care about. Soon after that he realized that he was mistaken. At this point everybody in audience laughed.

This meeting was a great opportunity for undergraduate students to see that studying at our faculty does not close doors to other professions. That it is possible to study mathematics or physics and then to work as a mathematician, an engineer, an actor, or anything else. It was a refreshing meeting that varied between a talk and a stand-up comedy show. To sum it up we had a good time and laughed a lot.

Seminar SIAM SC



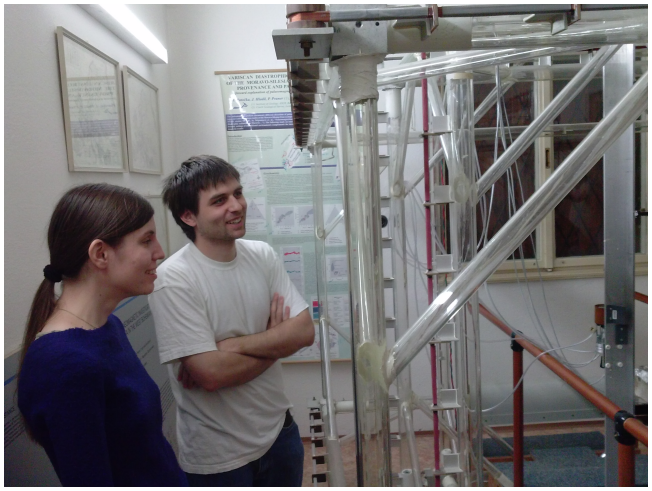
We have held a regular seminar every year since the founding of our Chapter. This year we had eight speakers and you can see the list of speakers and their talks below. The majority of people who attends our seminar are students of study programs Mathematical and Computer Modelling in Physics and Engineering, and Numerical and Computational Mathematics. However, there are staff members of the faculty as well as students of physics and informatics among attendants.

In summer semester a talk given by Peter Lukáš also served as a class for undergraduate students. The reason for this was that there was an overlap between a topic of his talk and a syllabus of a lecture. It was an unexpected turn of events but it was very much appreciated by students.

As in the last year we kept on concluding every seminar by having pizza and discussing all kinds of topics, mostly related to a given talk that day. We hope the seminar serves not only as a place to present and listen to talks from different fields of mathematics, but as well as a place of meeting other students and socializing with them.

- **Jan Kuřátko** (Charles University in Prague) – Unconstrained and Constrained Falsification of Hybrid Dynamical Systems
- **Filip Roskovec** (Charles University in Prague) – Superconvergence of the Time Discontinuous Galerkin Method and its Connection to Runge-Kutta Methods
- **Malte Kampschulte** (RWTH Aachen University) – Gradient Flows in the Framework of (Cartesian) Currents
- **Keiichi Morikuni** (The Czech Academy of Sciences) – Inner-iteration Preconditioning for Singular Linear Systems
- **Ivan Soukup** (Charles University in Prague) – Introduction to Problematic of Collision Detection and Shape Modification of STL Bodies
- **Petr Petráček** (Charles University in Prague) – The Theory of Paleomagnetism - its Origins and How It Is Used in Dating of Igneous Rock Formations and Modelling of Earth's Crust Movement
- **Petr Lukáš** (Charles University in Prague) – How to Choose the Free Parameters in Stabilized Finite Element Methods?
- **Petr Tichý** (The Czech Academy of Sciences) – From Krylov Subspace Methods to Approximation Theory

Field Trip to a Laboratory of Department of Paleomagnetism



After the talk given by Petr Petráček at our seminar SIAM SC we decided to organize a field trip to a laboratory of Paleomagnetism. It was meant as a continuation of a talk so we could see the equipment and machines that are used in this field. Since the laboratory is located outside of Prague in a park which is in UNESCO World Heritage, we also planned for a walk there.

When we arrived there we were welcomed by the head of the laboratory and other three researchers. They prepared a short lecture about paleomagnetism, the movement of Earth's crust and study about Earth's magnetic field flips in the past. After that they showed us round the laboratory and happily answered all our questions. We were allowed to try to run few machines with them explaining how it works and what it is used for. Among the participants we had one student of Geology from our faculty and she was very happy to see how is research done in their field.