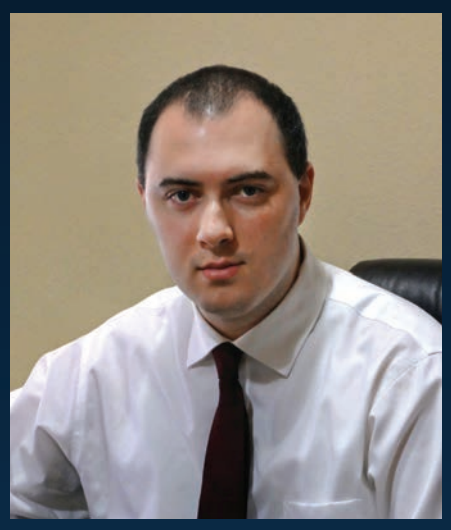
CZECH TECHNICAL UNIVERSITY IN PRAGUE

FACULTY OF ELECTRICAL ENGINEERING

DEPARTMENT OF TELECOMMUNICATION ENGINEERING

would like to invite you to a guest lecture of



Eugeny Sosnovsky, Sc.D.

Massachusetts Institute of Technology (MIT)

Nuclear Science and Engineering, USA

Open source engineering software, and academia's role in its development

The practice of computational modeling and simulation (aka Computer-Aided Engineering, or CAE), as well as code and methods development for it, are currently steadily increasing in importance in modern industrial and academic research and development. This is true for multiple reasons, including computational power, algorithm development, cost of experiments and current state of engineering disciplines.

Some CAE software is developed commercially (e.g., NI MultiSIM, DS SolidWorks), but often, free and/or open-source components, or full analogs (e.g., kTechLab, FreeCAD), exist. Many of these and other CAE tools rely on scientific and computational software libraries, such as BLAS/LAPACK, Trilinos, SPICE or GSL, which are free and/or open source software, distributed under permissive licenses.

Modeling is a huge and constantly evolving part of modern engineering. CAE software therefore has to keep up with industrial standards, constantly growing computational power, competition, new theoretical developments and experimental data, and the evolving needs of the user base. Commercially-developed CAE software generally cannot target a too-narrow market, which leaves them too expensive or too broad to fulfill niche needs or to be used for academic research. Such needs are best fulfilled with free and/or open source software. Universities and other academic institutions around the world are the ideal developers of such software: (a) they are in no danger of disappearing (a common problem for open source software); (b) they staff technically advanced and capable personnel; and (c) the non-commercial nature of university software is not an issue, because universities are non-profit.

The Computational Reactor Physics Group (CRPG) of MIT Nuclear Science and Engineering department has extensive experience in the release and support of open source CAE software. In this lecture, Dr. Sosnovsky from MIT NSE CRPG will discuss the above topics in more detail, and will share the experience acquired by MIT NSE CRPG, as well as answer any questions.

When: **27th November at 13:00 – 14:30**

Where: **Technicka 2, Prague 6, room T2:B3-703**

Eugeny Sosnovsky, Sc.D., is a senior software engineer at Varian Medical Systems (Gig Harbor, WA, USA), and a postdoctoral researcher at the Massachusetts Institute of Technology Department of Nuclear Science and Engineering (Cambridge, MA, USA). In 2008, Dr. Sosnovsky got his undergraduate degrees in Mechanical Engineering and Physics, with high distinction, at Worcester Polytechnic Institute (Worcester, MA, USA). Immediately after, he entered the MIT department of Nuclear Science and Engineering (MIT NSE), where he successfully defended a Master's (2010) and a Doctoral (2014) dissertations, subsequently working as a postdoctoral associate. For two years as a doctoral candidate at MIT, Dr. Sosnovsky also read lectures in nuclear reactor physics. At MIT, Dr. Sosnovsky worked with Profs. Forget and Baglietto, conducting research in nuclear reactor multiphysics and safety analysis methods development and application. His doctoral dissertation, entitled „Nuclear Reactor Multiphysics via Bond Graph Formalism" (MIT NSE, 2014), is a culmination of six years of work in the development of graph theory-based methods for transient analysis of nuclear reactors.

As a senior software engineer at Varian Medical Systems, Dr. Sosnovsky leads the development of the Attila software product line. Attila is a deterministic radiation shielding software suite, used a variety of industrial and scientific applications, including medical and industrial imaging, spacecraft and reactor shielding, security and inspection, and other similar applications. Dr. Sosnovsky's work on Attila focuses on adding new features to the serial and parallel computational modules, improving the meshing and solver capabilities, and maintaining the code's accuracy via a variety of physical benchmarks.

The MIT NSE Computational Reactor Physics Group, of which Dr. Sosnovsky was a founding member, has extensive experience in releasing and maintaining open source computational software for scientific and engineering modeling and simulation. Examples include the OpenMC and OpenMOC Monte Carlo and Method Of Characteristics neutron transport codes, or Sosnovsky's own BGSolver, a MATLAB-based bond graph processing package intended for engineering multiphysics models. In 2014, open source software is an increasingly significant component of modern engineering analysis, and it is primarily contributed to by universities and other non-profit institutions. Dr. Sosnovsky's upcoming talks will focus on the intricacies of releasing and maintaining such specialized codes from academia, and the challenges and rewards associated with doing so.

https://comtel.fel.cvut.cz