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Keynote Lecture II

FEniCS - A Free Software Framework for Efficient Solution of Differential Equations, with Applications in Mechanics

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Abstract - The talk first presents the FEniCS software for solving Partial Differential Equations (PDEs) by finite element methods. With FEniCS, variational forms can be specified with a syntax (in Python) that closely resembles the mathematical notation. The variational forms are compiled into problem-specific, highly optimized C++ code and linked with various libraries (including PETSc and Trilinos). Some simple examples of FEniCS features and applications will be shown. The talk then continues by describing some more advanced Python libraries built on top of FEniCS, that have been developed over the last few years at the Centre for Biomedical Computing (http://cbc.simula.no) at Simula Research Laboratory. Advanced applications include biomedical flow in the Cerebrospinal fluid as well as state-of-the-art turbulent combustion modelling.