Prof. Jože Korelc

Prof. Korelc is professor at the Faculty of Civil and Geodetic Engineering, University of Ljubljana, and Vice-President of the Scientific Computing Committee of ECCOMAS. He is also a primal developer of the commercial software systems **AceGen** and **AceFEM** for on-demand numerical code generation and finite element analysis. His research examines an interdisciplinary approach to computational mechanics as synthesis of classical numerical methods and symbolic-algebraic systems. He has published numerous articles on finite element technology for solid and contact problems, material modelling, sensitivity analysis, automatic code generation and the use of symbolic methods in engineering.

Registration

It would be highly appreciated if you register yourself for the lectures via e-mail to schulte@ikm.uni-hannover.de

Graduate School
MUSIC
Multiscale Methods for
Interface Coupling

Contact

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Location

The lectures will take place at the CAD-Pool (room-nr. A008) at building nr. 3409, Appelstr. 9, 30167 Hannover (Institute of Turbomachinery and Fluid Dynamics) .
The campus is served by two underground lines, line 4 to Garbsen and line 5 to Stöcken, getting off at the stop "Appelstraße".

Short Course on Automation of Computational Modelling

Prof. Jože Korelc
University of Ljubljana

21 - 22 June 2018
Leibniz Universität Hannover, Germany

Automation of Computational Modelling

Many advances in the reliability, generality and interdisciplinary nature of new computational methods developed in recent years can be attributed to a holistic approach to computational modelling, in which advanced software tools and techniques are combined with advanced numerical methods. The holistic approach is playing nowadays a central role in the process that leads to the goal of complete automation of computational modelling.

The automated generation of computational models has been explored by researchers from the fields of mathematics, computer science and computational mechanics, resulting in a variety of approaches and available software tools.

The main objective of the course is to provide theoretical background as well as practical training for automatic generation of finite element codes using Mathematica based code generation system AceGen (www.fgg.uni-lj.si/symech/). All lectures will be given in English. Students will be encouraged to try to use symbolic approach on their specific field of research. All the participants will get students AceGen/AceFEM license and lecture notes.

Day One – June 21:

### Introduction to automation with AceGen and AceFEM

The first day lectures will address the broad area of advanced software technologies for scientific computing. It will be demonstrated that an efficient automation can be achieved using the automatic differentiation technique combined with the symbolic problem description, automatic code generation and code optimization. Participants will get insight into symbolic description of computational models with symbolic code generator AceGen and implementation in the finite element environment AceFEM.

09:00 – 12:00
Advanced software technology: automatic differentiation, symbolic systems, hybrid systems, automatic generation of numerical codes. AceGen: hybrid symbolic-numeric system for multi-language and multi-environment generation of numerical codes.

14:00 – 18:00
AceFEM: hybrid symbolic-numeric finite element environment. Examples of automation of the nonlinear finite element method: problem definition; element formulation; elasticity; plasticity, direct and sensitivity analysis.
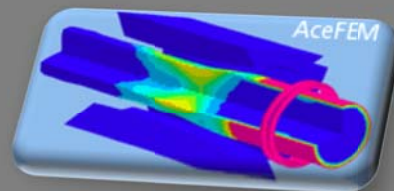
Day Two – June 22:

Advanced topics in automation of numerical modelling

The second day lectures will address advanced topics in automation of numerical modelling with the focus on the latest advances and techniques implemented in AceFEM and AceGen.

9:00 – 12:00
What is new in AceGen and AceFEM. Implementation of Fe^2 and MIEL, second order sensitivity analysis, meshing and re-meshing with AceFEM, advanced control of solution procedures, coupled problems.

13:30 – 16:30
New AceShare libraries, dynamics, elements with variable number of nodes, connecting with other FEM systems. Q&A session