

# IX. Berliner *Mathematica*-Tag

16. November 2007

**Ort** : Erhard-Schmidt  
Hörsaal im  
Weierstrass Institut  
Mohrenstrasse 39  
U-Bahn Station:  
Hausvogteiplatz



## Programm (Stand 22.10.07)

**9.30 Uhr:** Begrüssung

**9.40 Uhr:** Dr. Jens-Peer Kuska (Uni Leipzig): *Interaktive Möglichkeiten von Mathematica 6 in der digitalen Bildverarbeitung*

**10.35 Uhr:** Jan Brugård (MathCore Engineering AB / Schweden): *Model based Control Design using MathModelica and Control Systems Professional.*

*11.30 – 12.15 Uhr Pause*

**12.15 Uhr:** Prof. Dr. Jože Korelc (Uni Ljubljana / Slowenia): *On demand numerical code generation and Finite Element Analysis with Mathematica.*

**13.00 Uhr:** Ing. Zdenek Buk (Czech Technical University in Prague): *Nature inspired Methods in Mathematica – Recurrent Neural Networks optimization using Continual Evolution Algorithms in the Mathematica Environment.*

**13.45 Uhr:** Gerd Lindner (PTB / Berlin) *Magnetische Nanopartikel, Modellbildung und Felder*

**14.00 Uhr:** Wilfried Gille (MLU Halle) *Mengenkovarianz einfacher geometrischer Körper mit Mathematica; Illusion oder machbar ?*

*14.15 – 14.45 Uhr Kaffeepause*

**14.45 Uhr:** Dr. Jens-Peer Kuska, Carsten Herrmann (mathemas / Kiel): *News and Introduction to Mathematica 6; How to adapt older version notebooks for use with Mathematica 6*

## Abstracts

**Jan Brugård (MathCore Engineering AB / Schweden): *Model based Control Design using MathModelica and Control Systems Professional.***

*This talk shows how the powerful combination of MathModelica System Designer Professional and Control System Professional can be used by engineers to facilitate control design. The presentation includes new MathModelica features, making MathModelica and Control System Professional an unparalleled combination for control design.*

**Ing. Zdenek Buk (Czech Technical University in Prague): *Nature inspired Methods in Mathematica – Recurrent Neural Networks optimization using Continual Evolution Algorithms in the Mathematica Environment.***

*This work is focused on methods of computational intelligence, mainly recurrent neural networks and the evolutionary algorithm. Implementation of these methods in Mathematica is shown. The recurrent neural networks represent a group of artificial neural networks capable of handling time-context-based data. How to implement such time contexts in neural networks in Mathematica environment is described. The second part of the presentation describes the continual evolution algorithm as a modification of the standard genetic algorithm and its application to the recurrent neural networks optimization. Selected parts of implementation and demonstration application in Mathematica are presented.*

**Wilfried Gille (MLU Halle): *Mengenvarianz einfacher geometrischer Körper mit Mathematica; Illusion oder machbar ?***

*Die Mengenvarianzfunktion geometrischer Figuren (z.B. von Ellipsoiden, Tetraedern, Kreiszyklindern, Halbkugeln ...) ist eine grundlegende Funktion in der stochastischen Geometrie. Diese Funktion (einschließlich abgeleiteter Terme) wird für Beugungsuntersuchungen in den Materialwissenschaften angewendet.*

**Gerd Lindner (PTB / Berlin): *Magnetische Nanopartikel, Modellbildung und Felder***

*Die Verteilung magnetischer Nanopartikel in den Organen nach Magnetischem Drug Targeting wird durch ein Kettenmodell beschrieben. Das zugehörige Magnetfeld wird für zwei experimentell relevante Magnetisierungsrichtungen berechnet und visualisiert.*

**Prof. Dr. Jože Korelc (Universität Ljubljana / Slowenia): *On demand numerical code generation and Finite Element Analysis with Mathematica.***

*The recently released packages AceGen and AceFEM bring a robust, optimized architecture for rapid numerical prototyping and finite element analysis to Mathematica. An overview of the functioning and features of the products will be given, followed by examples of performance of the product on multi-physics and multi-field problems.*

*The AceGen package is used for the automatic derivation of formulae needed in numerical procedures. The common experience of every Mathematica user when symbolic approach is used to describe complex engineering problems is uncontrollable expression swell, redundant operations and inefficient codes. An approach, implemented in AceGen, avoids the problem of expression swell by combining: symbolic and algebraic capabilities of Mathematica, automatic differentiation technique, simultaneous optimization of expressions, automatic selection and introduction of an appropriate intermediate variables and automatic generation. With Mathematica and its support for multiple languages and environments, AceGen enables the generation of numerical code for a variety of systems from the same symbolic description. The AceGen package provides automatic interface to general numerical environments (MathLink connection to Mathematica, Matlab©) as well as interface to specialized finite element environments (AceFEM©, FEAP©, ELFEN©, ABAQUS©,...).*

*The AceFEM package is a general finite element environment designed to solve multi-physics and multi-field problems with Mathematica. The package explores the advantages of symbolic abilities of Mathematica while maintaining numerical efficiency of commercial finite elements environments. In combination with the automatic code generation package AceGen, the AceFEM package represents an ideal tool for a rapid development of new numerical models. The AceFEM package is the first commercial finite element environment that effectively combines symbolic and numeric approach. The theoretical advances that made this possible are presented as well as examples where performance of symbolically generated elements is compared with performance of finite elements build-in other commercial finite element environments.*

**Dr. Jens-Peer Kuska (Uni Leipzig): *Interaktive Möglichkeiten von Mathematica 6 in der digitalen Bildverarbeitung***

*Wieso bringt Interaktivität Vorteile ? Auf diese Frage wird in diesem Vortrag mit Anwendungs-Beispielen aus der biologischen Bildverarbeitung eingegangen. Dabei werden auch die neuen grafischen Eigenschaften in Version 6 behandelt.*

**Dr. Jens-Peer Kuska, Carsten Herrmann (mathemas / Kiel): *News and Introduction to Mathematica 6***

*Ein kurzer Überblick über die Neuigkeiten der Version 6 und neue Produkte. Eingegangen wird auch auf das Thema Umschreiben ältere Notebooks.*