

# History of the Chemnitz Finite Element Symposia

Talk on the occasion of the 25th Symposium 2012

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1978–1990

# November 15–16, 1978: The first Symposium

**Title:** „Symposium über Anwendungen und rechentechnische Realisierung der Methode der Finiten Elemente“

(„Symposium on applications and computer realization of the finite element method“)

**Hosts:** Prof. Manfred Schneider for Technische Hochschule Karl-Marx-Stadt (THK), Sektion Mathematik

Prof. Lothar Jentsch for Bezirksvorstand der Mathematischen Gesellschaft der DDR

**Driving force:** Reinhard Lehmann

**Further organizers:** Werner Hambach, Hans-Peter Linke, Klaus Hoyer, Joachim Siegert

**Participants:** 120, among them 36 from industry

# 1978: The first Symposium

From the application for financial support:

- The finite element method is applied in industry  
exchange of information is urgently necessary
- Aims of the symposium:
  - ▶ presentation of software
  - ▶ introduction to methods for solving finite element systems of equations
  - ▶ discussion of trends
  - ▶ training for mathematicians in industry
- Emphasis of the leading role of THK in Numerical Mathematics
- Expectation of new contacts with industry, impulses for research at THK

Good source of information: Archive of the TU Chemnitz.

# 1978: The first Symposium

Invited speakers with short title:

Johannes Altenbach (Magdeburg): Foundations and applications of the FEM

Jürgen Dankert (Magdeburg): Concept of the software COSAR

Meinhard Kuna (Halle): FEM in crack mechanics

S. Koczyk (Magdeburg): Nonlinear mechanics and FEM

Klaus-Dieter Drey (Zwickau): Computation of elsto-plastic deformations

Eberhard Höfer (Karl-Marx-Stadt): Application of FEM in high pressure  
apparatus construction

Heinz Gründemann (Karl-Marx-Stadt): Computations in the investigation of  
the chipping process

Wilgard Lang (Karl-Marx-Stadt): Computation of eigenvalues

Gerhard Maeß (Rostock): Minimization of the bandwidth of large sparse  
matrices

13 contributed talks

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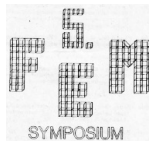
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**Bernd Heinrich:** Emphasis was on applications of the FEM.

**Reinhard Lehmann:** Enthusiasm in the organization with some chaotic parts.  
One of the speakers gave his talk with support from Braustolz.

# 1981, 1984, 1987, 1990: 2nd–5th Symposium

- title and hosts as 1978
- Ulrich Langer became more and more the driving force
- always more than 100 participants (101, 140, 160,  $\approx 200$ )
- logos from 1984



- 3rd Symposium: error estimates, nonlinearities, comparison of FEM with other methods, efficient solvers, new software development
- 4th Symposium: complex non-linear and non-stationary problems, implementation on high performance computers (see also talk by Gundolf Haase tomorrow after Dinner)

## 1978–1990

Thanks to Ulrich Langer we have some photos from the 1984 Symposium.



1991–1995

# 1991–1995

- 1991–1992 Application for a large research project
- 1993–1995: DFG research group *Scientific Parallel Computing*



- Smaller workshops:
  - February 28–March 2, 1991: FEM and BEM: problems of theory and applications
  - June 7–9, 1993: Parallel Pre- and Postprocessing in the FEM
  - May 27–28, 1994: Parallel solution of large systems of equations
  - September 27–30, 1995: Parallel scientific computing in FEM and BEM
- Later we decided to count these workshops as Chemnitz Finite Element Symposia 6–9.

1997–2005

# 1997–2005

- 1996–2005: DFG SFB 393 *Parallel Numerical Simulation* . . .



- In 1997 we decided to organize annual workshops and to call them **FEM Symposia** once more.
- Arnd Meyer became the main responsible person.
- First time web pages and photo of the participants.
- An excursion became a regular part of the conference.

# 1997

## ● Topics:

- ▶ Parallel algorithms in solid mechanics
  - ★ Parallel solvers for finite element equations (Christian Wieners)
  - ★ Models in structural mechanics
  - ★ Mortar elements in domain decomposition (Barbara Wohlmuth)
- ▶ Anisotropic discretizations (Gert Lube, Serge Nicaise)





# 1998

- Topics:
  - ▶ Parallel adaptive methods
    - ★ Error estimation (Rüdiger Verfürth)
    - ★ Mesh refinement
    - ★ Load balancing
  - ▶ Applications in fluid mechanics (Dieter Hänel)
- Excursion to Freiberg (Drusenkabinett)



- Topics:
  - ▶ Solvers for finite element systems
  - ▶ Applications in structural mechanics (Peter Wriggers)
  - ▶  $p$ - and  $hp$ -version of the FEM (Stefan Holzer)
  - ▶ Implementation on parallel computers
- Excursion to Seiffen



# 2000

- English is the official language since 2000.
- Standard topics since 2000: Finite elements in general
  - ▶ Adaptivity
  - ▶ Anisotropic meshes (Michal Křížek)
  - ▶ Solving the finite element systems
  - ▶ Implementation on parallel computers (Zdenek Bittnar)
- Focussed topics 2000
  - ▶ Applications to coupled flow problems (Miloslav Feistauer, Lutz Tobiska)
  - ▶ Boundary eigenvalue problems
- Excursion to Kriebstein dam and castle



# 2001

- First time more than one photo
- Standard topics as in 2000 (Ernst Rank)
- Focussed topics 2001
  - ▶ Modern aspects of mixed formulations, in particular
    - ★ Stokes problem (David Silvester)
    - ★ Mindlin-Reissner plates (Rolf Stenberg)
  - ▶ Discontinuous Galerkin methods
- Excursion to Augustusburg



# Ehrenfriedersdorf 2002

- First time outside Chemnitz
- Focussed topics
  - ▶ solution of elastic contact problems (Heribert Blum)
  - ▶ anisotropic mesh generation and error estimation (Joachim Schöberl, Luca Formaggia)
  - ▶ wavelets discretizations (Wolfgang Dahmen)
  - ▶ PDEs in finance
- Excursion to silver mine *Sauberg*



# Ehrenfriedersdorf 2003

- 25 years after the first Symposium, Special Issue of APNUM
- Poster session due to too many talks, SIAM book exhibition
- Focussed topics
  - ▶ fast solvers (Ulrich Langer, Markus Melenk)
  - ▶ simulation of materials with nonlinear properties
  - ▶ mixed formulations (Manfred Dobrowolski)
  - ▶ problems with anisotropic solution (Ricardo Duran)
- Excursion to Greifensteine



# Ehrenfriedersdorf 2004

- Many people had left TU Chemnitz

Reinhold Schneider, Gerd Kunert, Sven Beuchler, Helmut Harbrecht, Thomas Apel

- Focussed topics

- ▶ error estimation (Rolf Rannacher)
- ▶ fem with stochastic data (Hermann G. Matthies)
- ▶ singular complement methods (Patrick Ciarlet)
- ▶ sparse approximation, H-matrices (Wolfgang Hackbusch)

- Excursion on Planetenwanderweg





# Schöneck 2005

- Last time supported by SFB 393
- Focussed topics
  - ▶ variational inequalities - contact and free b.v.p. (Barbara Wohlmuth)
  - ▶ p.d.e.s in optimization and optimal control (Fredi Tröltzsch)
  - ▶ special treatment of singularities and singularly perturbed problems
  - ▶ parabolic and time-dependent problems (Gert Lube)
  - ▶ wavelet discretizations (Reinhold Schneider)
- Excursion to *Meiler* and Rock *Alter Söll*

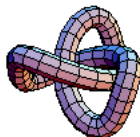




2006–

# 2006—

- After SFB 393: The Finite Element Symposium has been continued!
- The host is now exclusively the Faculty of Mathematics of TU Chemnitz.



- We have a logo for the Symposium.



- The Scientific Committee was set on a broader basis, in 2006  
Th. Apel (München), G. Haase (Graz), B. Heinrich (Chemnitz), M. Jung (Dresden), U. Langer (Linz), A. Meyer (Chemnitz), O. Steinbach (Graz)
- Due to financial restrictions to the PhD students from Chemnitz we decided that the Symposium will take place in Chemnitz every second year.

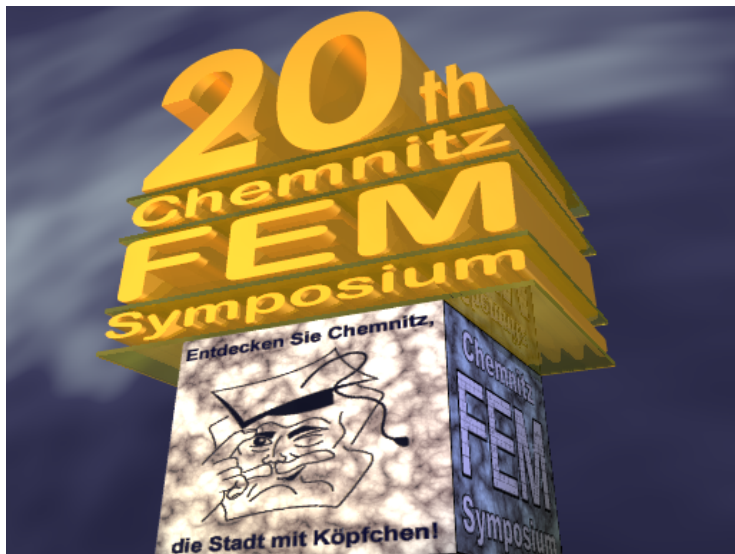
# TU Chemnitz 2006

- We started counting: 2006 is the 19th Chemnitz FEM Symposium.
- Focussed topics
  - ▶ finite element methods for Maxwell equations (Ralf Hiptmair)
  - ▶ finite elements for advanced problems in solid mechanics (Carsten Carstensen)
  - ▶ saddle point problems (Andy Wathen)
  - ▶ inverse problems for PDEs (Roland Griesse)
- Excursion to Augustusburg



# Schlosshotel Klaffenbach 2007

- The logo is hidden.



# Schlosshotel Klaffenbach 2007

- On the occasion of the 20th Symposium: Special Issue in ETNA
- First time (since 1990) two parallel sessions
- Focussed topics
  - ▶ Computational Fluid Dynamics (Lutz Tobiska)
  - ▶ Contact problems and large deformations (Ralf Kornhuber)
  - ▶ Mortar methods / Discontinuous Galerkin methods (Peter Hansbo)
  - ▶ Solvers and preconditioners (Arnold Reusken)
- Instead of excursion visit of the Schloss Klaffenbach (museum)



# Mercure Hotel Kongress Chemnitz 2008

- Focussed topics
  - ▶ Finite Elements in Biomechanics and Biomedicine (Gerhard Holzapfel)
  - ▶ Shells and Plates (Luisa Donatella Marini)
  - ▶ PDEs on surfaces (Gerhard Dziuk)
- Excursion



# Oberwiesenthal 2009

- First time with Press Release
- Focussed topics
  - ▶ Solver and Domain Decomposition (Axel Klawonn)
  - ▶ Sensitivity Analysis and Algorithmic Differentiation for FEM (Andrea Walther)
  - ▶ FEM for Maxwell Equations (Martin Costabel)
- Excursion to Fichtelberg



# Lichtenwalde 2010

- Focussed topics
  - ▶ Adaptive Methods (Kunibert Siebert)
  - ▶ Eigenvalue Approximation for Differential Operators (Klaus Neymeyr)
  - ▶ Singularly Perturbed Problems (Martin Stynes)
  - ▶ Special talk on Automated Scientific Computing (Anders Logg)
- Excursion to Schloss Lichtenwalde





# Holzhaus 2011

- Focussed topics
  - ▶ *hp*-FEM and Applications (Alexander Düster)
  - ▶ Variational Inequalities (Ernst P. Stephan)
  - ▶ Saddle Point Problems (Walter Zulehner)
- Excursion to Brewery Rechenberg



- First time Opening by the Rector
- Focussed topics
  - ▶ Plates and Shells (Manfred Bischoff)
  - ▶ Domain Decomposition (Martin Gander)
- Jubilee: 60th birthdays of Arnd Meyer and Ulrich Langer
- Photo still to be taken



# Final remarks

# Main organizers

Young scientists learn to organize a conference:

2012 Andreas Günnel

2011 Jens Rückert

2010 Frank Schmidt

2009 René Schneider

2008 Torsten Hein

2007 René Schneider

2006 Beate Jung

2005 Ulf Kähler

2004 Tino Eibner

2003 Gerd Kunert

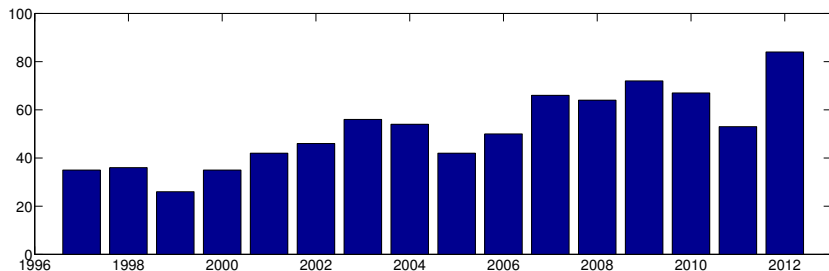
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of course with support of Kerstin Seidel, Matthias Pester and others.

Many thanks to all of them!

# Some statistics

- number of participants per year



- two parallel sessions since 2007

# More statistics

- 772 participants were counted
  - ▶ based on the lists of participants of all the years, except:
  - ▶ 1978 (only non-Chemnitz participants and speakers are known)
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  - ▶ Olaf studied in Chemnitz till 1992 and feels connected with the TU since then. But he has been working mainly in Stuttgart and Graz. He participated in the Symposium 15 times since 1993.
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- We also start to award „Non-Chemnitz people“ for their fifth consecutive participation. This year, the award goes to **Herbert Egger** for participating 2008–2012 (even from 2007).

- Thanks go to Matthias Pester, Peter Weigand, and many others for help with the statistics.
- Thanks go to Roland Herzog for the awards.
- Apologies for unintended incorrectnesses and omissions.