# topoptSYMP2005

# **IUTAM-SYMPOSIUM**

# **Topological design optimization of structures, machines and materials** - status and perspectives

October 26 - 29, 2005 Rungstedgaard Copenhagen, Denmark

# Programme

# As of October 12, 2005

## Wednesday, Oct. 26:

11.00 - 12.00 Arrival and Registration

12.00 - 14.00 Lunch

- 14.00 16.00 Lectures Level sets and FEM (Chairman: Martin P. Bendsøe)
  - 1. Structural optimization using topological and shape sensitivity via level set method. <u>Grégoire Allaire</u> and François Jouve
  - 2. Radial Basis Functions and Level Set Methods for Topology Optimization. <u>Michael Yu Wang</u> and Shengyin Wang
  - 3. XFEM developments for shape and topology optimization. <u>Pierre Duysinx,</u> Laurent Van Miegroet, Jean-Michel Lejeune & Thibaut Jacobs.
  - 4. Topology Design of Three-Dimensional Structures using Hybrid Finite Elements C. S. Jog
- 16.00 16.30 Coffee
- 16.30 18.00 Lectures Classics revisited (Chairman: Helder C. Rodrigues)
  - 1. Force fields within Michell-like cantilevers transmitting a point load to a straight support Cezary Graczykowski, <u>Tomasz Lewinski</u>
  - 2. Comparison of truss and continuum topology optimal designs <u>Pauli Pedersen</u> and Niels L. Pedersen
  - 3. Some basic issues of topology optimization. <u>G. Rozvany</u> and Osvaldo M. Querin
- 18.00 20.00 Dinner
- 20.00 22.00 Poster session with beer

ALL posters are up.

Short 4 minutes presentations from the groups: **Composites and cellular structures** and **Mathematical programming and modelling** (Chairman: Ole Sigmund)

# Thursday, Oct. 27:

- 09.00 10.30 Lectures Image processing ideas and level sets (Chairman:Alex Diaz)
  - 1. Recent results on impedance imaging for inhomogeneities of small volume fraction Yves Capdeboscq
  - 2. Phase Field Method in Optimal Design Blaise Bourdin, Antonin Chambolle
  - 3. Level Set based Shape Optimization of Geometrically Nonlinear Structures Seonho Cho
- 10.30 11.00 Coffee
- 11.00 12.00 Lectures Industry and software (Chairman: Kurt Maute)
  - 1. Industrial implementation and applications of topology optimization and future needs. <u>Claus B. W. Pedersen</u> and Peter Allinger
  - 2. Recent Developments in the Commercial Implementation of Topology Optimization. Uwe Schramm
- 12.00 14.00 Lunch
- 14.00 16.00 Lectures -- Mechanisms and Multiphysics (Chairman: Gengdong Cheng)
  - 1. Configuration Design of Rigid Link Mechanisms by an Optimization Method: A First Step.

Yoon Young Kim, Gang Won Jang, Jung Hun Park, Jin Seup Hyun

- 2. The pressure load problem re-visited. <u>O. Sigmund</u> and P.M. Clausen
- 3. Topology optimization of a structure in magnetic fields. Jeonghoon Yoo
- Topology optimization of electro-mechanical microsystems for non-matching computational meshes. Michael Raulli

16.00 - 16.30 Coffee

- 16.30 18.00 Lectures Waves (Chairman: Yoon Young Kim)
  - 1. Structural Topology Optimization of Mechanical Resonators, Actuators and Sensors. <u>Shinji Nishiwaki</u>, Emilio C. N. Silva, Kazumi Matsui, Kenjiro Terada, Kazuhiro Izui, and Masataka Yoshimura
  - 2. Topology optimization of wave transducers. <u>Martin Berggren</u> and Eddie Wadbro
  - Optimal mode coupling in simple planar waveguides. David C. Dobson
- 18.00 20.00 Dinner

20.00 - 22.00 Poster session with beer

ALL posters are up.

Short 4 minutes presentations from the groups: **Geometry modeling** and **Acoustics and fluids and actuators** (Chairman:Niels Olhoff)

# Friday, Oct. 28:

09.00 - 10.30 Lectures -- Mathematical programming issues (Chairman: Anders Klarbring)

- 1. The worst-case multiple load problem revisited. Michal Kocvara and Michael Stingl
- 2. Simultaneous Optimization of Truss Topology and Geometry, Revisited. Wolfgang Achtziger
- 3. First and second order sensitivities with respect to binary variables in topology optimization.

Krister Svanberg, KTH.

- 10.30 11.00 Coffee
- 11.00 12.00 Lectures **Bio** (Chairman: Pauli Pedersen)
  - 1. Bio-inspired Material Design and Optimization. Xu Guo and Huajian Gao
  - 2. Protein Sequence Design on the Basis of Topology Optimization Techniques. G. K. Ananthasuresh
- 12.00 14.00 Lunch

# 14.00 - 16.00 Lectures -- Topological derivatives, sound, and other features

(Chairman: R. Lipton)

- 1. Topological-Shape Sensitivity Method: Theory an Applications. <u>A.A. Novotny</u>, R.A. Fejóo, E. Taroco, C. Padra
- 2. Topological derivatives in shape optimization of contact problems Jan Sokolowski, Antoni Zochowski
- 3. Topology optimization of vibrating bi-material plate structures with respect to sound radiation.

Niels Olhoff and Jianbin Du

4. A Feature-based Structural Topology Optimization Method <u>Gengdong Cheng</u>, Yulin Mei, and Xiaoming Wang

16.00 - 16.30 Coffee

- 16.30 18.00 Lectures -- Composites and graded materials (Chairman: G. Rozvany)
  - 1. Design of graded microstructure for point wise stress control. <u>Robert Lipton</u> and Michael Stuebner
  - 2. Hierarchical Optimization of Material and Structure for Thermal Transient Problems J.M. Guedes, E. Lubrano, H. C. Rodrigues and S. Turteltaub
  - 3. Structural design of foam filled structures using gradient based optimization algorithms <u>A. Lipka</u>, E. Ramm
- 19.00 24.00 Conference Dinner

#### Saturday, Oct. 29:

- 09.00 10.30 Lectures Fluids and materials(Chairman: C. Jog)
  - 1. The Darcy-Stokes topology optimization problem. Thomas Borrvall, <u>Anders Klarbring</u>., Niclas Wiker
  - 2. Topology Optimization for Fluid-Structure Interaction Problem. Kurt Maute, G. Pingen, A. Evgrafov
  - 3. New optimal structures and new bounds for multimaterial conducting composites. <u>Andrej Cherkaev</u> and Nathan Albin
- 10.30 11.00 Coffee
- 11.00 12.00 Lectures New approaches (Chairman: Gregoire Allaire)
  - 1. Multidisciplinary Topology Design and Partial Differential Games A. Habbal
  - 2. Reliability-Based Topology Optimization (RBTO). <u>Semyung Wang</u>, Heegon Moon, Chwail Kim and Jenam Kang
- 12.00 14.00 Lunch and departure

# **POSTER SESSIONS:**

## **Geometry modeling**

- Topology Optimization by Penalty (TOP) Method Tyler E: Bruns
- Topological derivatives: Making holes.
  J. Norato, <u>R.B.Haber</u>, D. Tortorelli, M.P.Bendsøe
- Topology Optimization with CAMD for Structures undergoing Finite Deformation <u>Kazumi Matsui</u>, Kenjiro Terada and Shinji Nishiwaki
- Spectral level set methodology in topology optimization <u>Alexandra A. Gomes</u> and Afzal Suleman

#### Acoustics and fluids and actuators

- Topology optimization for acoustic-structure interaction problems <u>Gil Ho Yoon</u>, Jakob Søndergaard Jensen, and Ole Sigmund
- Topology optimization in fluids using FVM and FEM. Allan Gersborg-Hansen
- Topology optimization for acoustic performance. Maria Bayard Dühring
- Topology optimization for wave propagation problems. Jakob Søndergaard Jensen and Ole Sigmund
- Topology Optimization of Piezoelectric Actuators Considering Geometric Nonlinearities.
  - E. Cardoso and Jun Fonseca

#### **Composites and cellular structures**

- On Discrete Material Optimization of Laminated Composite Shell Structures using Global and Local Criteria Jan Stegmann and Erik Lund
- Analysis and continuum topology optimization of periodic solids with linearized elastic buckling criterion M.M. Neves
- Design of Cellular Structures for Optimum Efficiency of Heat Dissipation—A three Dimension formulation <u>Wang Bo</u> and Cheng G.D.
- Topology Design of Periodic Bistable Structures <u>Alejandro Diaz</u> and Jitendra Prasad
- Topology optimization for crystal fibers. Jesper Riishede and Kristian Hougaard.
- Optimal Design in Small Amplitude Homogenization <u>G. Allaire</u>, S. Gutierrez
- Eigenfrequency and Buckling Optimization of Laminated Hybrid Composite Shell Structures Using Discrete Material Optimization <u>Erik Lund</u> and Jan Stegmann
- Optimal topologies for micropolar solids <u>Marco Rovati</u>, Daniele Veber

# Mathematical programming and modelling

- Cellular Automata Paradigm for Topology Optimisation Mostafa M. Abdalla and Zafer Gürdal
- Relaxations for Topology Optimization Problems with Local Stress Constraints. Roman Stainko
- Global optimization of topology design problems models, methods and applications Mathias Stolpe
- A zero memory Gauss-Newton method forimaging and topological optimization Jerome Fehrenbach, <u>Mohamed Masmoudi</u>