FENET TECHNOLOGY WORKSHOP

27th - 28th February 2002

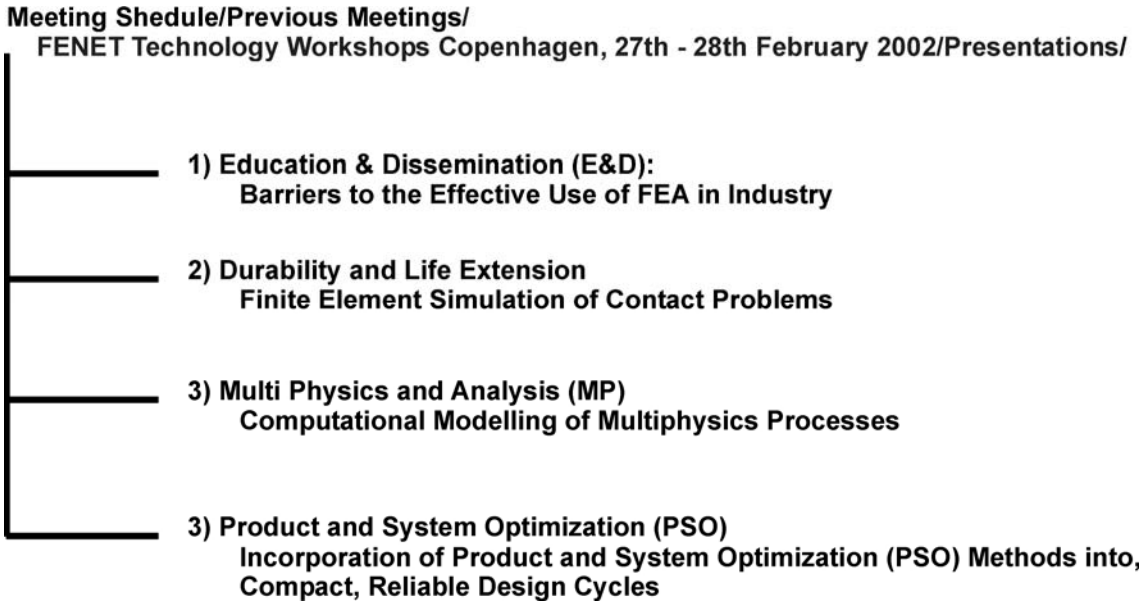
Copenhagen, Denmark

How to Use / Structure

This directory contains most of the presentations from the FENET Technology Workshop, 27th - 28th February 2002, Copenhagen Europe Center, Denmark.

The main directory **Meeting Shedule/Previous Meetings/ FENET Technology Workshops Copenhagen, 27th - 28th February 2002/Presentations/** is divided into subfolders in which you find word documents, MS Powerpoint files or pdf documents to download. There are also some avi files which belong to presentations.

All available presentations are listed in this document. The name of the file is written in italics (>>E_D_lecturer.ppt<<). If you are interested in a presentation please go to the subfolder and download the file.



1 Education & Dissemination (E&D): Barriers to the Effective Use of FEA in Industry

Experiences from European project on distance learning
Martin Dutko, Rockfield Software Limited, Swansea, U.K.
T.Kenny, NAFEMS, U.K.
Summary
Experiences gained within IST project MOPLE (Development of a Modular Open-Platform & Tools for Personalized Learning in Computational Engineering Methods)
>>E_D_Dutko.ppt<<

Barriers to the Effective Use of Virtual Prototypes in Industry … the LMS View
P. Guisset, LMS – Belgium
Summary
User experiences, barriers for deployment of Virtual Prototyping methodologies
>>E_D_Guisset.pps<<

Industrial Experiences in Finite Element Analyses from the Defence Sector
Charles Kernthaler, AWE, U.K.
Summary
The use of FEA in a modern business environment is described. Attention is focused on integrating FEA within a model based engineering enterprise and applying FEA as part of model based assurance.
>>E_D_Kernthaler.ppt<<

Do we have to know how an engine is working to be able to drive it ?
... barriers and expectations for FEA from several viewpoints
E. Lete, Samtech s.a., Belgium
Summary
Barriers depending on the category of users:
designer, project engineer, analyst or other.
Barriers depending on the stage in the sales process:
Marketing, sales and post sales.
Barriers depending on the type of companies:
SME, Large group, consultancy company or Academics.
Barriers depending on the place we use it:
Own office and own computer, remote computer or at customer site.
>>E_D_Lete.ppt<<

The Supply of Engineering Graduates - A UK Perspective
John Smart, University of Manchester, U.K.
Summary
Figures are given to show the reducing supply of engineering graduates from UK Universities. The implications are discussed.
>>E_D_Smart.ppt<<

2 Durability and Life Extension
Finite Element Simulation of Contact Problems

Workshop Introduction and Objectives
A. Becker, University of Nottingham, U.K.
>>DLE_Becker-1.pdf<<

Alternative Technology: Boundary Element Contact Analysis
A. Becker, University of Nottingham, U.K.
>>DLE_Becker-2.pdf<<

Running NAFEMS Contact Benchmark Problems using MSC. Marc
Adrie Bout, MSC. Software Benelux B. V., The Netherlands
Summary
– Some general comments
– Detailed discussion of the NAFEMS
Benchmark Problems CGS- 1 to CGS- 10
– Conclusions and recommendations
>>DLE_Bout.pdf<<

FE Simulation of Paper Calendering
Y. Deger, Sulzer Markets and Technology AG, Switzerland
Summary
In the production process paper is calendered (smoothed) under high temperature and pressure whilst passing through one or more nips formed by elastic and hard rolls at high speeds. As a matter of fact the quality of the paper depends on various operational parameters, including the positioning and interaction of the rolls. Under the contract of Voith Sulzer Finishing GmbH, Krefeld, Germany, Sulzer Innotec has performed an investigation of the deformations of the individual rolls and their contact properties under selected operational conditions for two different positioning of the calender. The work aimed firstly to prove qualitatively that the model reproduces the deformation and force quantities observed during operation of the present calender. In a second step, changes of the significant contact pressure distributions and deformations of the rolls were to be estimated for a prospective modification of the roll positions. In addition, the influence of the rolling movement on the contact conditions has been studied by means of the „steady state transport“ analysis capability of ABAQUS. This method suitably combines the Eulerian and Lagrangian approaches for the description of movement and deformation and accounts for frictional and inertial effects. The presentation highlights selected modelling details of this case study and discusses the results obtained.
>>DLE_Deger.pdf<<

Contact Benchmarks with PERMAS
R. Helfrich, INTES GmbH, Germany
Summary
A number of benchmarks out of NAFEMS Report R0081 together with the results achieved by PERMAS are presented (CGS-1, CGS-2, CGS-3). In addition, a number of benchmark cases are proposed to cover frictional contact in particular. Finally some general comments on contact analysis are made.
>>DLE_Helfrich.pp<<t
>>DLE_Helfrich.pdf<<

Contact Between Flexible Bodies in Nonlinear Analysis, Using Lagrange Multipliers
P. Jetteur, Samtech s.a., Belgium
Summary

This paper deals with contact in nonlinear analysis. Only implicit schemes are looked at. In order to solve the contact problem, an augmented lagrangien procedure is used. The resulting system of equations is solved simultaneously for the displacements and Lagrange multipliers. Contact between two flexible boedies and contact between a flexible body and a rigid surface are treated. A special care is taken when the flexible body is modelised by second order element in 3d analysis.

>>DLE_Jetteur.pdf<<

FE Modelling of Contact Phenomena in Structural Analysis
A.Konter, Netherlands Institute of Metals Research, The Netherlands
Summary
Overview of contact analysis using FE
Contact comparisons MSC.Marc & Abaqus
Seminar themes
- FE contact benchmarks
- difficulties by FE users in modeling contact problems
- current limitations of commercial FE codes
- desirable contact features not currently offered by FE software
- need for further research in application of contact problems

Concluding remarks

>>DLE_Konter.pdf<<

Coupling FE Contact and Heat Transfer Analysis in Investment Casting Simulations
G. Laschet, L. Haas, Access e.V., Germany

>>DLE_Laschet.pdf<<

Overview of Current NAFEMS Contact Benchmarks
N. Prinja, NNC Ltd., U.K.

>>DLE_Prinja.pdf<<

Advanced Contact Benchmarks
A. Prior, HKS Ltd., U.K.

>>DLE_Prior.pdf<<

3 Multi Physics and Analysis (MP)
Computational Modelling of Multiphysics Processes

XML/STEP/OMG Technologies to Facilitate Generic Coupling of Different Analysis Codes
C. Armstrong, QUB, U.K.
Summary
100's commercial codes available (FEA, FV, BEM, DEM)
STEP AP209 specification – carefully planned
Describes structures, fields, changes of state
PDM enabled and feedback to design compliant
XML - Method of Storing OO data
Lightweight Specification for interoperable EA enterprise applications
May be combined with an OMG equivalent specification for CAE services
>>MP_Armstrong.ppt<<

Computational Modelling of Multi-physics Processes: Case studies
The workshop challenges.
Three issues to address:
FIRST to consider how you would formulate a model to simulate the process from scratch without the constraints of existing computational modelling software technologies
SECOND - simplify the formulation to address the problem from one or more perspectives with existing commercial software software technologies that group members are familiar with
THIRD - evaluate what software technology would need to be developed so that the problem can be addressed comprehensively
>>MP_Case_Studies.ppt<<

Multiphysics Simulation & Integration
Applications to Casting Analysis
M.Chiumenti, CIMNE, Spain
Summary
Multi-physics Analysis
filling analysis
solidification analysis
solution strategy
Casting Analysis
FIAT console
SEAT break part
>>MP_Chiumenti.pps<<

Overview of the challenges of MULTI-PHYSICS
Mark Cross, Avril Slone, Centre for Numerical Modelling and Process Analysis
University of Greenwich, London, U.K.
Eugenio Onate, Pere-Andreu Ubach
CIMNE, UPC, Barcelona, Spain
Summary
Most CAE analysis software tools based upon single discipline:
CFD (fluid flow, heat transfer, combustion)
CSM (structures, dynamics, contact, heat transfer)
CEM (electro-magnetics)
Acoustics
What of their interactions?
- mostly we cheat or ignore them
>>MP_Cross_Onate_Ubach_Overview.ppt<<

Challenges of Multi-Physics Coupling in a Commercial FE Code
David Ellis, Idac Ltd, London, U.K.

Summary
This presentation will illustrate the capabilities of the ANSYS® program for solving Multiphysics Coupled Field solutions and describe the challenges faced in solving these problems as well as offering some advice in tackling these challenging physics simulations.

>>MP_Ellis.ppt<<
>>MP_Ellis.zip<< (with all avi-files)

Applications on Fluid-Structure interaction
Arnau Folch, Centro Internacional Métodos Numéricos en Ingeniería (CIMNE), Spain
Summary
1. Overview to multiphysics
   Computational Strategies
   Monolithic vs. partitioned schemmes. Who wins the match ?
2. Fluid-Structure interaction
   General problem
   Solution Strategies for partitioned schemmes
   ALE formulation
3. Applications
   Aerodynamic coefficients of a large span suspended bridge
   Launching of a missile
   Caldera-forming volcanic eruptions

>>MP_Folch.ppt<<
>>MP_Folch.zip<< (with all avi-files)

LIMITATIONS OF THE FINITE ELEMENT MODELLING OF TRAUMATIC INJURY
Mike Neale, Biomechanics and Injury Prevention Group, TRL Limited, U.K.
Summary
Brief background to TRL Limited
Detail limitations of modelling human biological system
Multi-physics modelling problems

>>MP_Neale.ppt<<

FREE SURFACE AND MEMBRANE-FLUID APPLICATIONS
Pere-Andreu Ubach, Eugenio Oñate CIMNE
Acknowledgments: Dr. Julio Garcia COMPASS IS
Lara Pellegrini

>>MP_Ubach.ppt<<

4 Product and System Optimization (PSO)
Incorporation of Product and System Optimization (PSO) Methods into, Compact, Reliable Design Cycles

Optimized and Reliable Structures - A Contradiction in Terms?
R. Helfrich (INTES GmbH - Germany)
Summary
The ESPRIT project ASRA-HPC
Integration of structural mechanics, optimization and reliability analysis
- solution of a combined optimization and reliability problem in an one-step approach

State-of the art technology for both domains
- High Performance Computing
- Adequate solution algorithms

GUI support for problem setup
Solution of industrially relevant problems

>>PSO_Helfrich.ppt<<

Discrete Variable Optimization using MSC.Nastran SOL200
Hans Sippel, MSC.Nastran Europe
Summary
Discrete Variable Optimization
Conventional optimization uses Mathematical Programming that yields continuous design variables
These design variables are not immediately usable
(i.e. you cannot make a plate of thickness 0.37582 cm).
With discrete optimization, the user can specify thicknesses available: according to standard gauges
Three methods: Conservative Discrete Design (CDD) / Design of Experiments (DOE) / Rounding up/off
Implemented as a postprocessing step to a continuous solution, this means 1 additional FE – analysis

>>PSO_Sippel.ppt<<