LSC – Laboratoire de mécanique des structures et milieux continus

Rapport d'activité 2001

Activité académique

Formation post-grade et continue, cours, séminaires

Workshop on creep, shrinkage and durability of concrete ; LSC, EPFL, 19 mars 2001 (Dr M. Jirasek, chairman ; main lecture « Concrete Durability, Scaling and Hygro-thermal Coupling » by Prof. Z. P. Bazant, Northwestern Univ.; contributions by O. Bernard, E. Denarié, C. Cecot, MCS).

Seminar on numerical methods for plasticity, localization and cracking ; LSC, EPFL, 3 avril 2001 (Dr M. Jirasek, chairman ; contributions by Dr G. Wells, Delft Univ., S. Commend, LSC and S. Rolshoven, LSC).

Modeling of damage and fracture in quasibrittle materials; COMMAS Summer School, Stuttgart, Allemagne, 11-12 octobre 2001 (M. Jirasek, enseignant).

Documents d'enseignement

F. Frey, « Méthode des éléments finis », Traité de Génie civil, vol. 6, PPUR, Lausanne, 2001.

Conférences (données au LSC)

Scaling in solid mechanics : from nano to mega, Prof. Z. P. Bazant, Northwestern University, USA ; 9 mars 2001.

Structural catastrophes : what have we learned ?, Prof. Z. P. Bazant, Northwestern University, USA ; 13 mars 2001.

Evolving strong and weak discontinuities and level sets in finite elements, Prof. T. Belytschko, Northwestern University, USA ; 18 mai 2001.

Cohesive cracks and the determination of the softening curve for concrete, Prof. J. Planas, Universidad Politécnica de Madrid, Espagne; 20 septembre 2001.

Thèses (LSC et autres)

Stabilized Finite Elements in Geomechanics ; S. Commend, LSC, EPFL, thèse n° 2391 (Th. Zimmermann, directeur ; F. Frey, rapporteur).

Corotational Formulation for a Geometrically Nonlinear Shell Element ; C. A. Falla Luque, LSC, EPFL, thèse n° 2353 (F. Frey, directeur).

Discontinuous Modelling of Strain Localisation and Failure; G. N. Wells, Delft University of Technology, 12 juin 2001 (M. Jirasek, membre du jury).

Hôtes académiques et visiteurs

Prof. Z. P. Bazant, Northwestern University, USA (1 mois)

Prof. J. Planas, Universidad Politécnica de Madrid, Espagne (2 semaines)

Participation à des manifestations scientifiques et techniques

(préciser si keynote lecture, conférence invitée, etc.)

10th International Conference on Computer Methods and Advances in Geomechanics (IACMAG), January 7-12, 2001, Tucson, USA (Th.Zimmermann, présentation d'une contribution).

GeoMath2: Second Euroconference on Mathematical Foundations of Geomechanics, Innsbruck, Autriche, 14-16 février 2001 (M. Jirasek et S. Rolshoven, ***conférence invitée***).

Regularized Models for Strain-Softening Materials, Politecnico di Milano, 27 février 2001 (M. Jirasek, ***conférence invitée***).

Le tremblement de terre de Los Angeles, conférence donnée à l'Ecole d'Architecture ATHENAEUM, février 2001 (F. Frey).

International Workshop on Deterioration Analysis of Engineering Materials at Various Scales of Observation, Hirschegg, Autriche, 25-27 mars 2001 (M. Jirasek, présentation d'une contribution).

4th International Conference on Fracture Mechanics of Concrete and Concrete Structures (FraMCoS), Cachan, France, 28 mai – 2 juin 2001 (M. Jirasek, S. Rolshoven, présentations de contributions).

First M.I.T. Conference on Computational Fluid and Solid Mechanics, Cambridge, USA, 12-14 juin 2001 (S. Rolshoven, présentation d'une contribution).

2nd European Conference on Computational Mechanics (ECCM), Cracovie, Pologne, 26-29 juin 2001 (F. Frey, M. Jirasek, B. Patzak, S. Rolshoven, présentation de contributions ; M. Jirasek et B. Patzak, ***keynote lecture***).

Première Conférence Internationale Albert Caquot « Modélisation et Simulation en Génie Civil : de la Pratique à la Théorie », Paris, 3-5 oct. 2001 (F. Frey, membre du comité scientifique et présentation d'une contribution).

1st Asian-Pacific Congress on Computational Mechanics (APCOM 01), Nov. 20-23, 2001, Sidney, Australia (Th. Zimmermann, présentation d'une contribution).

Eurock 2001 Conf., Espoo, Finland, June 2001 (S. Commend, présentation d'une contribution).

13th Annual Workshop of ALERT Geomaterials, Aussois, France, 8-10 octobre 2001 (M. Jirasek, B. Patzak, présentations de contributions).

Mandats, expertises et fonds de recherche

FNRS - Commission Génie civil et Mines ; réunion de la commission, Bruxelles, mars 2001 (F. Frey, membre).

RILEM Technical Committee QFS: Size Effect and Scaling of Quasibrittle Fracture; réunion de la commission, Cachan, 30 juin 2001 (M. Jirasek, membre).

Development of a comprehensive model of jointed rock for design of foundations and underground structures ; subside FN-SCOPES 2000-2003 (Th. Zimmermann).

Regularized material models for damage and fracture ; subside FN 2000-2001 et subside EPFL 2000-2001 (F. Frey et M. Jirasek).

Adaptive techniques for simulation of concrete fracture with application to anchoring systems ; subside CTI 2000-2001 (M. Jirasek et F. Frey).

Modélisation et analyse par éléments diffus (sans maillage) d'ouvrages souterrains tridimensionnels ; subside CTI 2000-2001 (Th. Zimmermann, F. Frey, L. Vulliet).

Galerkin least square finite element formulations for plasticity and partially saturated two-phase media ; subside FN 1996-2001 (Th. Zimmermann, A. Truty, F. Frey).

Distinctions

Erwin Stephan Preis, TU Berlin, à S. Rolshoven, LSC.

Bourse E.D.F. à S. Rolshoven, LSC.

M.I.T. Fellowship à S. Rolshoven, LSC.

Autres

Congé sabbatique, Prof. F. Frey, Université de Liège, Faculté des Sciences Appliquées, Département M&S, Liège ; six mois, septembre 2001-février 2002.

Publications

Livres

F. Frey, « Méthode des éléments finis », Traité de Génie civil, vol. 6, PPUR, Lausanne, 2001.

M. Jirasek and Z.P. Bazant, « Inelastic analysis of structures », John Wiley, Chichester, 2001.

Revues

Carol I., Jirasek M. and Bazant Z.P.
A thermodynamically consistent approach to microplane theory. Part I. Free energy and consistent microplane stresses. Int. J. Solids and Structures, 38:2921-2931 (2001).

Commend S., Zimmermann Th.
Object-oriented Nonlinear Finite Element Programming : a Primer. Advances in Engineering Software, 32:611-628 (2001).

Eyheramendy D., Zimmermann Th.
Object-oriented finite elements. IV: Symbolic derivations and automatic programming of nonlinear formulations. Computer Methods in Applied Mech. and Engineering 190:2729-2751 (2001).

Jirasek M., Zimmermann Th.
Embedded crack model I : Basic formulation. Int. J. Numerical Methods in Engineering, 50:1269-1290 (2001).

Jirasek M., Zimmermann Th.
Embedded crack model II : Combination with smeared cracks. Int. J. Numerical Methods in Engineering, 50:1291-1305 (2001)

Jirousek J., Zielinski A. P., Wroblewski A.
T-elements analysis of plates on unilateral elastic Winkler-type foundation ; Computer Assisted Mechanics and Engineering Sciences, 8:343-358 (2001).

Planas J., Bazant Z.P., and Jirasek M.
Reinterpretation of Karihaloo's size effect analysis for notched quasibrittle structures. Int. J. Fracture, 111:17-28 (2001).

Actes, comptes-rendus, proceedings

Bazant Z.P., Jirasek M.
Nonlocal and gradient concepts in computational plasticity and damage mechanics. Proc. 6th U.S. Congress of Computational Mechanics, Dearborn, Michigan, 2001.

Bisetti A., Tendon D., Commend S., Zimmermann Th.
Finite Element Stability Analyses of Natural Caves. Proc. Eurock 2001 Conf., Espoo, Finland, 2001.

Carol I., Jirasek M., Bazant Z.P.
New thermodynamic framework for microplane model. Fracture Mechanics of Concrete Structures, Balkema, Lisse, The Netherlands, 519-624.

Eyheramendy D., Zimmermann Th.
Future directions in object-oriented symbolic derivations of finite elements. Proc. 6th US Congress on Computational Mechanics, Dearborn, USA, 2001.

Frey F., Rebora B., Sarf J.-L.
Pourquoi calculer avec précision la ruine par instabilité des blindages en acier des galeries d'amenées d'eau ?, dans : Modélisation et simulation en génie civil : de la pratique à la théorie ; Presses de l'ENPC, Paris 2001.

Frey F., Zielinski A. P.
Weighted residual formulation of tangent stiffness matrices for structural elements ; Proc. 2nd European Conference on Computational Mechanics, Cracow, June 2001.

Jirasek M., Patzak B.
Process zone resolution by extended finite elements. Fracture Mechanics of Concrete Structures, Balkema, Lisse, The Netherlands, 805-808.

Jirasek M., Patzak B.
Models for quasibrittle failure: Theoretical and computational aspects. Solids, Structures and Coupled Problems in Engineering, Proc. ECCM-2001, Cracow, Poland, 70-71 and 20 pages on CD-ROM.

Patzak B., Jirasek M.
Consistent tangent stiffness for nonlocal material models. Solids, Structures and Coupled Problems in Engineering, Proc. ECCM-2001, Cracow, Poland, 658-659 and 16 pages on CD-ROM.

Rolshoven S., Jirasek M.
Comparative study of nonlocal and gradient plasticity models. Fracture Mechanics of Concrete Structures, Balkema, Lisse, The Netherlands, 617-624.

Yufin S., Vlasov A.N., Zertsalov M.G., Sidorova P.A., Zimmermann Th.
Numerical Approach to Generating Constitutive Models of Jointed Rocks. Proc. Eurock 2001 Conf., Espoo, Finland, 2001.

Zimmermann Th., Commend S.
Stabilized finite elements. Applications in geomechanics. Proc. 1st Asian-Pacific Congress on Computational Mechanics, Sydney, Australia, 2001.

Zimmermann Th., Commend S., Truty A., Sarf J.-L.
Numerical Simulations for Dam Constructions. Proc. 10th IACMAG Conf., Tucson, Arizona, 2001.

Rapports

M. Jirasek, B. Patzak
Adaptive techniques for simulation of concrete fracture with application to anchoring systems; Rapport pour Hilti AG, décembre 2001.