

# Matthias Preisig

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## Personal

Born on April 25, 1977.

Swiss Citizen.

## Education

Dipl. Ing. EPFL, Civil Engineering, Swiss Federal Institute of Technology, Lausanne, 2002.

M.S. Geotechnical Engineering, University of California, Davis, 2005.

Ph.D. Structural Engineering, Swiss Federal Institute of Technology, Lausanne, 2002.

## Employment history

September 2010 – August 2011: Postdoctoral researcher  
Civil and Environmental Engineering, Princeton University  
Supervisor: Prof J.H. Prévost

September 2009 – August 2010: Postdoctoral fellow of the Swiss National Science Foundation  
Civil and Environmental Engineering, Princeton University  
Supervisor: Prof J.H. Prévost

January 2009 – April 2009: Researcher  
ENAC-LSMS, Swiss Federal Institute of Technology, Lausanne  
Supervisor: Prof Th. Zimmermann

May 2005 – December 2008: PhD Student  
ENAC-LSMS, Swiss Federal Institute of Technology, Lausanne  
PhD Advisor: Prof Th. Zimmermann  
(including a five month visit with the group of Prof. T.J.R. Hughes at the Institute for Computational Engineering and Sciences at the University of Texas at Austin)

November 2003 – May 2005: Research and Teaching Assistant  
University of California, Davis  
(research on numerical analysis of dynamic soil-structure interaction, thesis advisor Prof B. Jeremić)

November 2002 – August 2003: Research and Teaching Assistant  
Swiss Federal Institute of Technology, Zurich  
(research on continous compaction control with vibratory rollers, supervisor Dr. M. Caprez, collaboration with Ammann Verdichtungs AG, Langenthal)

July – September 2002: Internship in structural engineering with Arup Consulting Engineers in Dublin, Ireland

August – September 2000: Internship with Japan Highway Public Corporation in Chiba, Japan

## Teaching

Solid mechanics (Lecturer, 2 credits), Joint School of Earth and Environmental Sciences of the Geneva and Lausanne Universities, 2008.

Structural dynamics and Finite element methods (Teaching assistant and replacements for Prof. Zimmermann), EPFL, 2005 - 2007.

Foundation design (Teaching assistant for Scott Brandenburg), UC Davis, 2004.

Design and construction in geotechnical engineering (Teaching assistant for Prof. Amann), ETH Zurich, 2002 - 2003.

Theoretical and experimental soil mechanics (Teaching assistant for Ivo Sterba), ETH Zurich, 2003.

## Awards and Fellowships

Swiss National Science Foundation, Fellowship for prospective researchers, 2009.

Swiss-American Chamber of Commerce, Graduate Student Fellowship, 2003.

Henry B. de Cérenville Prize for the best Diploma Thesis in Geotechnical Engineering, EPFL, 2002.

## Publications

M. Preisig. Locking-free numerical methods for nearly incompressible elasticity and incompressible flow on moving domains, *Computer Methods in Applied Mechanics and Engineering*, DOI:10.1016/j.cma.2011.11.010 (unedited version available online at <http://dx.doi.org/10.1016/j.cma.2011.11.010>).

M. Preisig, J.H. Prévost. New findings on limit state analysis with unstructured triangular finite elements, *submitted*.

M. Preisig, J.H. Prévost. Coupled multi-phase thermo-poroelastic effects. Case study: CO<sub>2</sub> injection at In Salah, Algeria, *International Journal of Greenhouse Gas Control* 5(4):1055–1064, 2011, DOI: 10.1016/j.ijggc.2010.12.006.

I.R. Goumiri, J.H. Prévost, M. Preisig. The effect of capillary pressure on the saturation equation of two phase flow in porous media, *International Journal for Numerical and Analytical Methods in Geomechanics* 5(8), 2011, DOI: 10.1002/nag.1022.

M. Preisig, J.H. Prévost. Fully coupled simulation of fluid injection into anisotropic porous media, *International Journal for Numerical and Analytical Methods in Geomechanics* 5(8), 2011, DOI: 10.1002/nag.1039.

M. Preisig, J.H. Prévost. Stabilization procedures in coupled poroelasticity problems: A critical assessment, *International Journal for Numerical and Analytical Methods in Geomechanics* 35(11):1207–1225, 2011, DOI:10.1002/nag.951.

M. Preisig, Th. Zimmermann. Numerische Modellierung von Erdbeben und Schlammlawinen, *Wasser Energie Luft* 120(1):27–30, 2010.

M. Preisig, Th. Zimmermann. Free-surface fluid dynamics on moving domains, *Computer Methods in Applied Mechanics and Engineering* 200(1-4):372–382, 2010, DOI: 10.1016/j.cma.2010.09.001.

M. Preisig, Th. Zimmermann. Two-phase free-surface fluid dynamics on moving domains, *Journal of Computational Physics* 229(7):2740–2758, 2010, DOI: 10.1016/j.jcp.2009.12.020.

- B. Jeremić, G. Jie, M. Preisig, N. Tafazzoli. Time Domain Simulation of Soil-Foundation-Structure Interaction in non-Uniform Soils. *Earthquake Engineering and Structural Dynamics* 38(5):699-718, 2009, DOI: 10.1002/eqe.896.
- Matthias Preisig. Modeling two-phase flows on moving domains. EPFL Thesis no 4250 (2008). Dir.: Thomas Zimmermann.
- M. Preisig, R. Noesberger, M. Caprez, P. Amann and R. Anderegg. Flächendeckende Verdichtungskontrolle (FDVK) mittels bodenmechanischer Materialkenngrößen. *Bundesamt für Strassen, No. 1129, Bern, Switzerland, 2006.*
- M. Preisig, B. Jeremic. Seismic Soil-Foundation-Structure Interaction: Numerical Modeling Issues. *Proceedings of the 2005 Structures Congress and the 2005 Forensic Engineering Symposium (ASCE)*, New York, April 20-24, 2005.
- J. P. Wolf, M. Preisig. Dynamic stiffness of foundation embedded in layered halfspace based on wave propagation in cones. *Earthquake Engineering and Structural Dynamics* 32(7):1075-1098, 2003, DOI: 10.1002/eqe.263.
- M. Preisig, M. Caprez, P. Amann. Validation of methods of Continuous Compaction Control (CCC) with vibratory rollers (in german). *Proceedings of the workshop on ground compaction, Technische Universität Hamburg-Harburg, Hamburg, 2003.*
- M. Preisig, J. P. Wolf. Dynamic stiffness of foundation embedded in layered halfspace based on wave propagation in cones. *Proceedings of the 12th European Conference on Earthquake Engineering*, London, 2002; Paper Reference 492.
- M. Preisig, J. P. Wolf. Dynamic stiffness of surface foundation on layered halfspace based on wave propagation in cones. *Proceedings of the 5th European Conference on Numerical Methods in Geotechnical Engineering (NUMGE 2002)*, Mestat (ed.), Paris, 2002.

## Presentations

- M. Preisig, J.H. Prévost. Coupled multi-phase thermo-poromechanical effects. Case study: CO<sub>2</sub> injection at In Salah, Algeria. American Geophysical Union Fall Meeting, San Francisco, U.S.A., December 13 - 17, 2010.
- M. Preisig, J.H. Prévost. Case study of coupled thermo-poromechanics simulation of CO<sub>2</sub> injection into a geological reservoir. Numerics in Geotechnics & Structures & Z\_SOIL.PC DAY, Lausanne, Switzerland, August 30th, 2010.
- M. Preisig, J.H. Prévost. Stabilization procedures in coupled poroelasticity problems: A critical assessment. 44th US Rock Mechanics Symposium, Salt Lake City, Utah, USA, June 27 - 30, 2010.
- M. Preisig, J.H. Prévost. Stabilization procedures in coupled poroelasticity problems: A critical assessment. 4th European Conference on Computational Mechanics, Paris, France, May 16 - 21, 2010.
- M. Preisig. Two-phase flows on moving domains. Invited speaker, Ecole Centrale Marseille, April 2, 2009.
- M. Preisig. Numerical Simulation of Mudflows. Numerics in Geotechnics & Structures & Z\_SOIL.PC DAY, Lausanne, Switzerland, August, 2008.
- M. Preisig, Th. Zimmermann. A Lagrangian Method for Two-Phase Flow Simulation. 8th World Congress on Computational Mechanics, Venice, Italy, June 30 - July 4, 2008.

M. Preisig, Th. Zimmermann. A Lagrangian Method for Two-Phase Flow Simulation. 9th US National Congress of Computational Mechanics, San Francisco, USA, July 23 - 26, 2007.

M. Preisig. Simulation of Landslides with Large Motions. Numerics in Geotechnics & Structures & Z\_SOIL.PC DAY, Lausanne, Switzerland, August, 2006.

M. Preisig. Numerical Analysis of Dynamic Soil-Foundation-Structure Interaction. Numerics in Geotechnics & Structures & Z\_SOIL.PC DAY, Lausanne, Switzerland, August, 2006.

M. Preisig, G. Jie, B. Jeremic. Seismic Soil-Foundation-Structure Interaction: Benefits and Detriments. 1st European Conference on Earthquake Engineering and Seismology, Geneva, Switzerland, September 3 - 8, 2006

M. Preisig, Th. Zimmermann. Landslide Simulation Using Natural Neighbor Based Meshless Method. 7th World Congress on Computational Mechanics, Los Angeles, USA, June 30 - July 4, 2006.

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