Rafal Filip OBRZUD

Civil and geotechnical engineer

PhD, EPFL (Lausanne, Switzerland)
MSc Eng., PK (Cracow, Poland)

Contact

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PROFESSIONAL ACTIVITIES

2011- **Geotechnical consultant engineer** (full time) *GeoMod Ing.Cons. SA*

Advanced 2D & 3D numerical modelling of soil-structure interaction accounting for nonlinear behaviour of materials, stress and water in situ conditions, and explicit definition of construction stages.

Participated in selected projects: Turbine foundations for pump-storage power plant Nant de Drance, pile raft foundation for the Multi-storey building Haus H in Zurich, 3rd correction of Rhône embankments in Vouvry and Colombey sectors, foundation for a new penstock in the hydro power plant in Monthey

2009 - 2011 **Geotechnical consultant engineer** (part time) *GeoMod Ing.Cons. SA*

2009 - 2011 **Geotechnical consultant engineer** (part time) *BG Ing.Cons. SA ,Lausanne, Switzerland*

Participated in selected projects: Noth excavation for Choindez motorway tunnel, Cavern for pump-storage power plant Nant de Drance, Cut-and-cover tunnel Pfyngut (A9 motorway), Railway tunnels (Sierre, Lovresse), reinforcement of Adolphe bridge in Luxembourg, Recreative harbor in Vevey, Bridge over the Rhône for H144 national road.

2003–2005 **Geotechnical engineer** *Cracow University of Technology (PK), Cracow, Poland*

Geotechnical investigations: *in situ* soil testing, subsoil profiling and soil parameter determination; numerical modeling; geotechnical reports.

2002-2005 **Project assistant** *Cracow University of Science and Technology (AGH), Cracow, Poland*

Collaborated the Institute of Underground Mining: Numerical analyses of access tunnels in Polish coal mines.

2001–2005 **Civil engineer** *AB – Projekt, Cracow, Poland*

Designed buildings and engineering constructions in concrete: verified static determination and structural element profiles; calculated and designed shallow foundations and piles; designed technical drawings of structural element profiles for public use multi-storey buildings.

Jul.-Aug. 2001 **Engineer assistant** *Biuro Konstrukcyjne (Grabacki&Szefer), Cracow, Poland*

Civil engineer's internship.

UNIVERSITY ACTIVITIES

Since 2010 **Zace Service Ltd.** *Lecturer*

Delivers lectures and courses on soil mechanics, rock mechanics and underground structure analysis on microcomputers using plasticity theory

2005-2009 **Ecole Polytechnique Fédérale de Lausanne (EPFL), Switzerland** *Research/teaching assistant*

Soil Mechanics Laboratory

Delivered lectures: Neural networks in geomechanics, Master of Advanced Studies on Tunneling, 2007 and 2008

Teaching assistant: Soil Mechanics, BS, 2008

2001–2005 **Cracow University of Technology (PK), Cracow, Poland** *Research/teaching assistant*

Institute of Geotechnics,
Teaching assistant: Soil Mechanics, MS; Foundations and Footing, MS, 2001-2005

EDUCATION

2006-2009 **Ecole Polytechnique Fédérale de Lausanne (EPFL), Switzerland**
Doctoral school, programme: Mechanics

PhD research: Numerical modeling and neural networks to identify constitutive parameters from *in situ* tests.

Main research activities: finite element modeling of soil field tests; generating pseudo-experimental databases from numerical simulations of pressuremeter and piezocone tests; application of neural networks and optimization techniques to parameter identification based on experimental results from field tests.

Thesis supervisors: **Prof. Laurent Vulliet** BG Consulting Engineers (Switzerland), Soil Mechanics Laboratory, EPFL

Prof. Andrzej Truty Zace Services Ltd., Z_Soil, (Lausanne, Switzerland), Institute of Geotechnics, Politechnika Krakowska (Cracow, Poland)

1996-2001 **Cracow University of Technology (PK), Cracow, Poland**
MSc in Civil Engineering; Specialization: Buildings and Engineering Constructions

SELECTED PUBLICATIONS

Numerical analysis of soil-structure interaction using advanced constitutive models calibrated based on laboratory and in situ test results. Truty A, Obrzud RF. XXVIII Ogólnopolskie Warsztaty Pracy Projektanta Konstrukcji, 5-8 March 2013, Wisla, Poland, II: 241-280 (*in Polish*).

Modélisation de sols à l'état de service. Commend S, Obrzud RF, Geiser F, Menétrey P. *Tracés,* 2012*,* 19:27-30 (*in French*).

Static soil-structure interaction analysis using ZSOIL.PC. Truty A, Podles K, Commend S. Obrzud R, Zimmermann Th. *Innovative Numerical Modelling in Geomechanics*, Sousa et al (eds), 2012, p.265-280.

Numerical modeling and neural networks to identify model parameters from piezocone tests: II. Multi-parameter identification from piezocone data. Obrzud RF, Truty A, Vulliet L. *Int J Numerical Analytical Methods in Geomechanics*, 2012, 36(6): 743-779.

Numerical modeling and neural networks to identify model parameters from piezocone tests: I. FEM analysis of penetration in two-phase continuum. Obrzud RF, Truty A, Vulliet L. *Int J Numerical Analytical Methods in Geomechanics*, 2011, 35(16): 1703-1730.

On the use of the Hardening Soil small strain model in geotechnical practice. Obrzud RF. *In Numerics in Geotechnics and Structures, Elmepress Int, Lausanne, 2010.*

The Hardening Soil model – a practical guidebook. Obrzud RF, Truty A. Technical report Z_Soil.PC 100701, Zace Services Ltd, Lausanne, August 2010-2012.

Numerical modeling and neural networks to identify constitutive parameters from insitu tests. Obrzud RF, *Phd Thesis*, EPFL, Lausanne, July2009.

A combined neural network/gradient-based approach for the identification of constitutive model parameters using self-boring pressuremeter tests, Obrzud RF, Vulliet L, Truty A, *Int J Numerical Analytical Methods in Geomechanics*, 2009, 33(6): 817-849.

Optimization framework for calibration of constitutive models enhanced by neural networks, Obrzud RF, Vulliet L, Truty A, *Int J Numerical Analytical Methods in Geomechanics*, 2009, 33(1): 71-94.

Soils stiffness in small strains, Truty A, Konior T, Obrzud RF, XVII Scientific Conference on Computer Methods in Design and Analysis of Engineering Constructions, Korbielów, Poland, 2005.

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SCIENTIFIC AND ENGINEERING SOFTWARE

Since 2010 - Collaborates with ZACE Ltd. for development of ZSoil, a finite element-based software for modelling the soil-structure interaction.

Developed framework for calibration of soil models using advanced neural network/gradient minimization method based on laboratory and *in situ* test measurements (*Matlab-based application combined with finite element solvers: ABAQUS and Z_Soil*).

COMPUTER SKILLS

Numerical methods	Computational continuum and structural mechanics, hydro-mechanical system computations, finite elements, optimisation, neural networks, statistics
FE packages	*ABAQUS*, *Z_Soil*
CAD packages	*AutoCAD*
Mathematics	*Matlab*, *Mathcad*, *Mathematica*
Others	Engineering Packages (e.g. *GEO-SLOPE, RIDO*)

LANGUAGES

Polish (native), **English** and **French** (advanced)

WORKSHOPS & TRAININGS

May 2007 **Nonlinear finite element analysis** *Berlin, Germany*
taught by T.J.R. Hughes & T. Belytschko

August 2006 **Soil mechanics, rock mechanics and underground structures analysis on microcomputers using plasticity theory** *Lausanne, Switzerland*
taught by A. Truty, K. Podles, Th. Zimmermann

May 2004 **Interpretation of in situ tests and sample disturbance of clays** *Baranowo near Poznan, Poland*
2nd International Workshop taught by: T. Lunne, J.J.M. Powell, Z. Młynarek et al.

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