

## Curriculum Vitae

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### Giuseppe Buscarnera

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#### Place and date of birth

Sciacca – Italy - August 26<sup>th</sup> 1983

#### Education

- July 2004: Bachelor Degree in Civil Engineering (awarded with honours) – Politecnico di Milano. Title of the thesis: “Modelling the response of shallow foundations under inclined and eccentric loads” (in Italian). Thesis supervisors: prof. Roberto Nova and prof. Claudio di Prisco.
- October 2006: Master Degree in Geotechnical Engineering (awarded with honours) – Politecnico di Milano. Title of the thesis: “Constitutive and numerical modelling of chemo-mechanical degradation effects in underground gypsum mines” (in Italian). Thesis supervisor: prof. Roberto Nova.
- February 2010: PhD in Geotechnical Engineering (awarded with honours) – Politecnico di Torino - PhD Program “Scuola Interpolitecnica” (joint PhD Program of excellence supported by Politecnico di Milano, Politecnico di Torino and Politecnico di Bari). Title of the dissertation: “Rainfall induced flow slides: constitutive modelling, mechanical instability and theoretical interpretation”. Thesis supervisors: Prof. Roberto Nova and Prof. Claudio di Prisco.

#### Current position

- Post-doctoral associate at the Department of Structural Engineering of the Politecnico di Milano (since January 2010).

#### Research stages

- September 2007 - January 2008: Research stage at the Department of Geotechnical Engineering and Geosciences of the Universitat Politècnica de Catalunya (UPC). Research activity: theoretical and experimental study of the mechanical behaviour of unsaturated soils subjected to wetting processes. Stage supervisor: prof. Antonio Gens.
- August 2008 - February 2009: Research stage at the Department of Civil and Environmental Engineering of the Massachusetts Institute of Technology (MIT). Research activity: constitutive modelling of sands and theoretical analysis of static liquefaction. Study of the triggering mechanisms of flow slides. Stage supervisor: prof. Andrew J. Whittle.
- May 2010: Visiting researcher at the Laboratoire 3S-R of Grenoble. Research activity: thermomechanical study of particle breakage in unsaturated granular materials. Stage supervisor: prof. Itai Einav.
- January 2011 – March 2011: Visiting researcher at the University of Sydney. Research activity: thermomechanical modelling of porous materials. Stage supervisor: prof. Itai Einav.

#### Main areas of expertise

- Constitutive modelling of geomaterials. Modelling the effects of non-mechanical perturbations (saturation processes, chemical effects, thermal effects, etc.) within the elastoplastic strain-hardening framework.
- Theoretical study of mechanical instability in geomaterials. Application to the static liquefaction of sands, failure processes in cemented soils and wetting-induced volumetric collapses.
- Application of the theory of material stability to slope stability analyses. Modelling the onset of flow slides in saturated sandy slopes. Analyses of rainfall-induced landslides in unsaturated slopes. Model calibration for natural soils involved in catastrophic slides of the flow type.
- Modelling the response of shallow foundations subjected to inclined and eccentric loads. Application to monotonic and cyclic loading conditions.
- Thermomechanical modelling of particle breakage in unsaturated granular materials. Application to unsaturated rockfill.

#### Achievements and Awards

- “Luciano Varischi” scholarship for the best student of the School of Engineering at the Politecnico di Milano during the academic year 2003/2004. Scholarship confirmed for the academic years 2004/2005 and 2005/2006.
- Gold medal of the Politecnico di Milano for the best graduate in Civil Engineering of the academic year 2003/2004 (Bachelor Degree).
- Gold medal of the Politecnico di Milano for the best graduate in Civil Engineering of the academic year 2005/2006 (Master Degree).

- Rocca Fellowship for a research stage at the Massachusetts Institute of Technology (MIT) during the Fall Semester 2008.

### **Professional Service**

- Reviewer for the International Journal for Analytical and Numerical Methods in Geomechanics (since 2009) and for Geotechnique Letters since (2010).
- Since January 2010 to present: post-doctoral associate at the Department of Structural Engineering of the Politecnico di Milano.

### **Affiliations to national and international societies and professional institutions**

- Member of the Italian Geotechnical Association (AGI) from 2006.
- Member of ISSMGE from 2006.
- Member of Italian registry of professional engineers (section of Agrigento).

### **Invited Seminars and Presentations**

- Invited Seminar at the Massachusetts Institute of Technology, (03/02/2009). Title of the seminar: "Rainfall induced flow slides: constitutive modelling and theoretical study".
- Presentation at the international conference COMPLAS X, (2-4 September 2009, Barcelona, Spain). Title of the presentation: "An investigation on instability loci in partially saturated soils".
- Presentation at the national symposium IARG 2009, (9-11 September 2009, Rome, Italy). Title of the presentation: "Modelling flow slides triggering in granular materials".
- Presentation at the international workshop "Modelling of natural hazards and vulnerability of structures in geomechanics", organized by ALERT Geomaterials (12/10/2009, Aussois, France). Title of the presentation: "Rainfall induced flow slides: a modelling approach to evaluate triggering conditions".
- Presentation at the international conference IV European Conference on Computational Mechanics, ECCM X, (16-21 May 2010, Paris, France). Title of the presentation: "The effect of multi-physical perturbations on geomaterial instability: a framework for hydro-mechanical coupling in crushable soils".
- Presentation at the international conference HSTAM 2010, (12-14 July 2010, Limassol, Cyprus). Title of the presentation: "A redefinition of the second order work for unsaturated soils".
- Presentation at the international conference UNSAT 2010, (6-8 September 2010, Barcelona, Spain). Title of the presentation: "Saturation induced instability on bonded geomaterials".
- Presentation at the international symposium COMGEO 2011, (26-29 April 2011, Cavtat, Croatia). Title of the presentation: "Modelling the onset of rainfall-induced landslides".
- Invited Seminar at The University of Sydney, (18/02/2011). Title of the seminar: "Modelling the activation of fast landslides: an engineering application of the theory of material stability".
- Invited Seminar at the Northwestern University, (28/02/2011). Title of the seminar: "Modelling the activation of fast landslides: an engineering application of the theory of material stability".
- Invited Seminar at the Laboratoire Sols, Solides, Structures, Risques of Grenoble, (30/05/2011). Title of the seminar: "Modelling the activation of fast landslides: an engineering application of the theory of material stability".

### **Teaching experience**

- Spring Semester 2009; Spring Semester 2010: teaching assistant for the course of "Laboratory of Geotechnical Design" for Civil Engineers at the Politecnico di Milano.
- Fall Semester 2009; Fall Semester 2010: teaching assistant for the course of "Soil Mechanics" for Civil Engineers at the Politecnico di Milano.
- Fall Semester 2009; Fall Semester 2010: teaching assistant for the course of "Slope Stability" for Civil and Environmental Engineers at the Politecnico di Milano.
- Fall Semester 2009: teaching assistant for the course "Hazard Analysis and Vulnerability Assessment" held in English language within the Master program in "Civil Engineering for Risk Mitigation" held at the Politecnico di Milano.
- Fall Semester 2010: course instructor of "Hazard Analysis", held in English language within the Master program in "Civil Engineering for Risk Mitigation" held at the Politecnico di Milano.

### **Publications on international journals**

- Buscarnera G., Nova R. (2009) "An elastoplastic strainhardening model for soil allowing for hydraulic bonding-debonding effects". Int. J. Numer. Anal. Meth. Geomech. 2009; 33:1055–1086.
- Buscarnera G., Nova R. (2009) "Loss of controllability in unsaturated soils". European Journal of Environmental and Civil Engineering , 13: 235–250.
- Buscarnera G., Nova R. (2011) "Modelling instabilities in triaxial testing on unsaturated soil specimens". Int. J. Numer. Anal. Meth. Geomech. 2011; 35:179–200.
- Buscarnera G., di Prisco C. (2010) "Discussing the definition of second-order work in unsaturated soils". Published online on the Int. J. Numer. Anal. Meth. Geomech. doi: 10.1002/nag.991.
- Buscarnera G., Dattola G., di Prisco, C. (2010) "Controllability, uniqueness and existence of the incremental

response: a mathematical criterion for elastoplastic constitutive laws". Published online in the International Journal of Solids and Structure, Volume 48, Issue 13, 15 June 2011, Pages 1867-1878.

- Buscarnera G., Einav I. (2010) "The yielding of brittle unsaturated granular soils". Accepted for publication in *Géotechnique*.

#### **Publications on national journals**

- di Prisco C., Buscarnera G. (2010) "Design, construction and monitoring of light-weight embankments" (in Italian). *Italian Geotechnical Journal*, 3, 10-28.

#### **Contributions to international and national conferences**

- Betti D., Buscarnera G., Castellanza R., Nova R. (2008) "Numerical analysis of the life-time of an abandoned gypsum mine", *Proc. 12<sup>th</sup> I.C. IACMAG, Goa*, 1210-1218.
- Buscarnera G., Nova R. (2008) "Loss of controllability in partially saturated soils", *2<sup>nd</sup> Euromediterranean Symposium on Advances in Geomaterials and Structures*, Hammamet, 5-7/5/2008, 3, 481-486.
- Buscarnera G., Nova R. (2009) "Modelling the onset of instability in oedometric tests on unsaturated bonded soils". *Proc. 1st COMGEO*, S. Pietruszczak, G.N. Pande, C. Tamagnini & R. Wan eds, Juan-les-Pins, France, 226-234.
- Buscarnera G., Nova R. (2009) "An investigation on instability loci in partially saturated soils". *Proc. X COMPLAS*, D.R.J. Owen, E. Oñate eds. Barcelona, 2009, 4pp.
- Buscarnera G., Whittle A.J. (2009) "Modelling flow slide triggering in granular materials". Contribution at the National symposium *Incontro Annuale Ricercatori di Geotecnica IARG 2009*, Roma "La Sapienza".
- Buscarnera G., Nova R., Vecchiotti M., Tamagnini C., Salciarini D. (2010). Settlement analysis of wind turbines. In: *Soil-Foundation-Structure-Interaction*, R.P. Orense, N. Chow, M.J. Pender (Eds.), pag. 171-178. 26-27 November 2009, Auckland, New Zealand.
- Buscarnera G., di Prisco C., Nova R. (2010) "The effect of multi-physical perturbations on geomaterial instability: a frame work for hydro-mechanical coupling in crushable soils". Accepted for publication on the proceedings of the IV European Conference on Computational Mechanics (ECCM 2010); Paris, France, May 16-21, 2010, 2 pp.
- Buscarnera G., di Prisco (2010) "A redefinition of the second-order work for unsaturated soils". *Proc. 9th HSTAM International Congress on Mechanics*, Limassol, July 12-14, 2010, pp. 197-204.
- Buscarnera G., Nova R. (2010) "Saturation induced instability on bonded geomaterials". *Proc. 4<sup>th</sup> International Conference on Unsaturated Soils (UNSAT 2010)*; Barcelona, Spain, September 6-8, 2010, pp. 771-777.
- Buscarnera G., di Prisco C. (2011) "Modelling the onset of rainfall-induced landslides". *Proc. 2nd COMGEO*, S. Pietruszczak, G.N. Pande, C. Tamagnini & R. Wan eds., Cavtat-Dubrovnik, Croatia, 173-182.

Milano, 21/06/2011