Curriculum Vitae of Andrea Francesco ROTUNNO, Ph.D

Personal Data

Andrea Francesco ROTUNNO, Ph.D, M.Sc.
Nationality: Italian.

Education

February 2018, Rome, Italy - Lyon, France. Ph.D. double diploma in Structural Engineering and Geotechnics - Mécanique.
Research project in joint supervision between the University of Rome "Tor Vergata" (Italy) and the École Centrale de Lyon (France).
PhD thesis: *Macro- and micro-scale computational modeling of the propagation of localized erosion in porous media. Application to hydraulic works.*
Advisors: C. Callari and F. Froiio.

October 2014, Rome, Italy. Master degree in Civil Engineering - Structural Engineering and Geotechnics (2 years course), University of Rome "Tor Vergata". *Mark: 110/110 cum Laude.*
Dissertation: *Una formulazione numerica per un modello di erosione interna* (English title: A numerical formulation for an internal erosion model).
Advisor: C. Callari.

March 2013, Rome, Italy. Bachelor degree in Civil Engineering (3 years course), University of Rome "Tor Vergata". *Mark: 110/110 cum Laude.*
Dissertation: *Profili di corrente in moto permanente con graduali variazioni di portata* (English title: Backwater curve in steady flow with smooth flow variations).
Advisor: P. Sammarco.

July 2008, Grottaferrata - Rome, Italy. Scientific High School Diploma (5 years course), *Liceo Scientifico Statale Bruno Touschek.*

Awards

2018 Awarded with the **Ph.D. European Label** by the University of Rome "Tor Vergata" - École Centrale de Lyon.

2015-2017. Awarded for the **Ph.D. Fellowship Program** by the University of Rome "Tor Vergata".

2015-2017. Awarded with the **"Vinci Ph.D. Mobility Program"** by the Italian–French University for the research project *"Numerical modeling of internal erosion in dams and levees".*

2017. Selected for the **RCM Scholarship** (Dr. Klaus-Körper Foundation Prize founds) by the Leibniz University of Hannover.

Research

Topics of computational geomechanics and mechanics of multiphase porous media, with applications to major civil works (dams, tunnels).

Multiphase porous media. Numerical formulation of internal erosion processes in embankment dams and levees. Focus on numerical analysis of "backward erosion piping" both at the macro- and at the micro-scale.

Conventional and mechanized tunneling. Numerical back-analysis and modeling of monitored response to excavation above and below the groundwater table in presence of coupling with fluid flow; interpretation of monitoring data and control of mechanized excavation in urban environment.

Research Projects

2016-2019 Contributor to the project on "**Computational modeling of erosion effects** on dams, levees, and historic artefacts", funded by the Department of Biosciences and Territory, University of Molise.

2016-2019 Contributor to the project on "**Seismic and hydro-geological risk** in Appennine areas: assessment methods and mitigation strategies", funded by the Research Center for Internal Areas and Appennines, University of Molise.

Partecipation and cooperation with international research group

2015-2017 GDRI GeoMech (international group INSIS-CNRS) "Multi-Physics and Multi-Scale Couplings in Geo-Environmental Mechanics".

2015-now Laboratoire Lagrange (French-Italian Research Group CNRS-CNR).

Pubblications

A. F. Rotunno. Macro- and micro-scale computational modeling of the propagation of localized erosion in porous media. Application to hydraulic works. *Ph.D. Thesis*, 2018.

A. F. Rotunno, F. Froiio and C. Callari. Discrete numerical modeling and micromechanical inspection of the front region in piping erosion. In preparation, 2018.

A. F. Rotunno, C. Callari and F. Froiio. A finite element method for localized erosion in porous media with applications to backward piping in levees. Submitted for peer-review Int. Journal, 2017.

A. F. Rotunno, C. Callari and F. Froiio. A finite element method for piping erosion in levees. In *Proceedings of 25th Annual Meeting of European Working Group on Internal erosion in Embankment Dams & their Foundations, EWG–IE*, September 4-7, ISBN 978-90-827468-0-8, 2017.

F. Froiio, C. Callari, **A. F. Rotunno** and A. Guidobaldi. A discrete numerical model of the front region in piping erosion. In *Proceedings of 25th Annual Meeting of European Working Group on Internal erosion in Embankment Dams & their Foundations, EWG–IE*, September 4-7, ISBN 978-90-827468-0-8, 2017.

A. F. Rotunno, C. Callari and F. Froiio. Computational modeling of backward erosion piping. In *Models, Simulation, and Experimental Issues in Structural Mechanics*, pages 225–234, Springer 2017.

A. F. Rotunno, A. Guidobaldi, F. Froiio and C. Callari. A numerical approach to backward erosion piping in levees. In *Proc. of the days of Sc. Res. UniMol-DiBT*, 2017.

A. F. Rotunno, C. Callari and F. Froiio. A finite element formulation for localized erosion propagating in porous media. In *Proc. of the days of Sc. Res. UniMol- DiBT*, page 69, ISBN: 9788896394199, 2016.

Invited Seminars

C. Callari, F. Froiio, **A. F. Rotunno** and D. K. Tran. *The collaborative research on internal erosion by ECL, UniMol and UniRoma2.* Seminar at the École Centrale of Lyon,. April 13, 2016.

Presentations at International Conferences

May 2018, Assisi, Italy. IV International Symposium on Computational Geomechanics. Title of presentation: *A discrete numerical model of the front region in piping erosion*, Rotunno A.F*, Callari C., Froiio F.

September 2017, Hannover, Germany. Particles 2017. Title of presentation: *Micromechanics of normal hydroerosion processes*, Rotunno A.F, Froiio F.*, Callari C., Tran D.K.

September 2017, Milan, Italy. ECCOMAS - Young Investigators Conference 2017. Title of presentation: *A finite element method for piping in deep excavations*, Rotunno A.F*, Callari C., Froiio F.

September 2017, Delft, the Netherlands. 25th Annual Meeting of European Working Group on Internal erosion in Embankment Dams & their Foundations. Title of presentation: *A discrete numerical model of the front region in piping erosion*, Froiio F.*, Callari C., Rotunno A.F, Guidobladi A.

September 2017, Delft, the Netherlands. 25th Annual Meeting of European Working Group on Internal erosion in Embankment Dams & their Foundations. Title of presentation: *A finite element method for piping erosion in levees*, Rotunno A.F*, Callari C., Froiio F.

June 2017, Rhodes, Greece. ECCOMAS - Coupled Problems 2017. Title of presentation: *A discrete numerical model of the front region of piping erosion*, Tran D.K., Rotunno A.F*, Froiio F., Callari C.

June 2017, Rhodes, Greece. ECCOMAS - Coupled Problems 2017. Title of presentation: *A computational method for piping erosion with hydro-mechanical coupling*, Rotunno A.F, Callari C.*, Froiio F.

March 2017, Hannover, Germany. Research Challenges in Mechanics 2017. Title of presentation: *A finite element approach for propagating cavities in porous media*, Rotunno A.F*, Callari C., Froiio F.

March 2017, Pesche, Italy. GDRS - UniMol 2017. Title of presentation: *A discrete numerical approach for piping erosion in levees*, Rotunno A.F, Guidobaldi A.*, Froiio F., Callari C.

October 2016, Metz, France. 2016 EMI International Conference. Title of presentation: *Computational analysis of propagating localized erosion in porous media*, Callari C., Rotunno A.F*, Froiio F.

June 2016, Lucca, Italy. XXI Convegno Italiano di Meccanica Computazionale (GIMC-GMA2016). Title of presentation: *A finite element formulation for localized erosion propagating in porous media*, Rotunno A.F*, Callari C., Froiio F.

June 2016, La Rochelle, France. MEGE - GDRI Geomech séminaire annuel. Title of presentation: *Modélisation numérique de l'érosion interne par approche multi-échelle : verrous scientifiques d'un projet collaboratif*, Froiio F*, Callari C., Rotunno A.F, D.K. Tran.

March 2016, Pesche, Italy. GDRS - UniMol 2016. Title of presentation: *A numerical approach to backward erosion piping in levees*, Rotunno A.F*, Callari C., Froiio F.

January 2016, Grenoble, France. MEGE - GDR Atelier thématique "Instabilité et rupture dans les sols roches et bétons: Comportement Constitutif et application aux ouvrages. Title of presentation: *Finite element modeling of the backward propagation of erosion piping*, Rotunno A.F*, Callari C., Froiio F.

September 2015, Paris, France. Colloquium Lagrangianum 2015. Title of presentation: *Computational modeling of backward erosion piping*, Rotunno A.F*, Callari C., Froiio F.

Post Graduate Courses

March 2017, Hannover, Germany. Short post-graduate workshop Research Challenges in Mechanics - AceGen & AceFem Workshop, organized by P. Wriggers at the Leibniz University of Hannover.

2016, Rome, Italy. Doctoral-school course Analytical Methods for Differential Equations (50 hours course), held by P. Sammarco at the Department of Civil Engineering and Computer Science Engineering - University of Rome "Tor Vergata". Final exam passed with honors (October 19^{th}, 2016).

June 2016, Rome, Italy. Doctoral-school short course Modelling Fractured Rocks and Masonry Structures by Joint Enriched Finite Element Method (8 hours course), held by A. Puoya and M. Chalhoub at the Department of Engineering - University Rome Tre.

May 2016, Pavia, Italy. Post-graduate course Nonlinear Computational Solid and Structural Mechanics (25 hours course), held by R.L. Taylor, F. Brezzi, M. Bischoff, F. Auricchio, G. Sangalli, and A. Reali at the Department of Civil Engineering and Architecture - University of Pavia.

January 2016, Rome, Italy. Doctoral-school course Numerical Implementation of Inelastic Constitutive Equations (12 hours course), held by C. Tamagini at the Department of Civil Engineering and Computer Science Engineering - University of Rome "Tor Vergata".

2015, Rome, Italy. Post-graduate course Computational Methods, held by D. Bertaccini, and S. Filippone at the Department of Mathematics - University of Rome "Tor Vergata".

June 2015, Rome, Italy. Doctoral-school course CONTINUUM DAMAGE MECHANICS: BASIC PRINCIPLES AND MICRO-MACRO MODELING (15 hours course), held by D. Kondo at the Department of Civil Engineering and Computer Science Engineering - University of Rome "Tor Vergata".

2015, Rome, Italy. Post-graduate course MECHANICS AND MODELS OF TURBULENCE, held by R. Verzicco, at the University of Rome "Tor Vergata".

TEACHING ACTIVITIES

SUPPORT TO INSTITUTIONAL COURSES

Lectures, trainings and oral exams at the Department of Civil Engineering and Computer Science Engineering - University of Rome "Tor Vergata".

2014 - 2018. Ponti e Gallerie - Laboratorio di Ponti e Gallerie (Bridges and Tunnels - Laboratory of Bridges and Tunnels). Tunnels module held by C. Callari. Master Degree in Civil Engineering.

Lectures and trainings at the Department of Bioscience and Territory - University of Molise.

2014 - 2018. Gallerie (Tunnels). Course held by C. Callari. Master Degree in Civil Engineering.

11 Co-tutorships for MSc thesis in Civil Engineering - Structures and Geotechnics at the University orf Rome "Tor Vergata", regarding topics of computational geomechanics, mechanics of porous media, as well as the analysis of major civil works, such as dams and tunnels.

TECHNICAL SKILLS & COMPETENCIES

Programming languages Excellent knowledge of FORTRAN, C and MATLAB. Experienced in Mathematica.

Operative systems Windows, Linux and Macintosh.

Applicative systems Excellent knowledge of Microsoft Office (Word, PowerPoint, Excel), and of advanced typesetting systems (Latex).

Softwares Excellent knowledge of Visual Studio, FEAP, Plaxis, MATLAB, Scilab and Mathematica.

Code development Finite element codes in *FORTRAN*. Discrete Element Method and Lattice Boltzmann Method code in *C*. Parallel and multi-thread programming with *OpenMP*.

LANGUAGES

Italian Mother tongue.

English Reading/Writing/Verbal skills: Fluent.

French Reading/Writing/Verbal skills: good working knowledge.

Rome, 15 maggio 2018