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PERSONAL INFORMATION

Ferdinando Marinelli

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WORK EXPERIENCE

September 2024 – Present

Associate Professor

Department of Civil and Environmental Engineering (DICEA), University of Naples Federico II
Via Claudio 21, Naples, Italy.

September 2021 – September 2024

Assistant Professor

Department of Civil and Environmental Engineering (DICEA), University of Naples Federico II
Via Claudio 21, Naples, Italy.

March 2018 – August 2021

Research Engineer

Developer in the Computational Department at Plaxis bv, a Bentley System Company.
Computerlaan 14, 2628 Delft, Netherlands.

EDUCATION AND TRAINING

March 2009 – January 2013

Ph.D. at University Grenoble Alpes, 3SR Laboratory (Grenoble, FR) in "*Matériaux Mécanique, Génie Civil, Electrochimie*".

September 2007 – June 2008

Master at University Joseph Fourier in "*Mécanique, Enérgetique et Ingenierie, spécialité Modélisation et Experimentation en Mécanique des Soildes*".

Janury 2009

Master degree in Civil Engineering, University of Rome Tor Vergata

March 2005

Bachelor degree in Civil Engineering, University of Rome Tor Vergata.

POST-GRADUATE EDUCATION

January 2014 – December 2017

Postdoc at Northwestern University in the Department of Civil and Environmental Engineering (Evanston, US).

February 2013 – December 2013

Postdoc at University of Grenoble Alpes, 3SR Laboratory (Grenoble, FR), in collaboration with University of Bergen.

COMUNICATION SKILLS

Mother tongue Italian

Other languages

	UNDERSTANDING		SPEAKING		WRITING
	Listening	Reading	Spoken interaction	Spoken production	
English	C1	C1	C1	C1	C1
French	C1	C1	B2	B2	B1
Spanish	A2	A2	A2	A2	A2

Levels: A1 and A2: Basic user – B1 and B2: Independent user – C1 and C2: Proficient user
Common European Framework of Reference for Languages

TEANCHING ACTIVITIES AND MENTORING

Courses for the Doctoral School

- Course of "Constitutive and Numerical Modeling of Geotematerials", in the Doctoral School "Structural Engineering, Geotechnics e Seismic Risk", at University of Naples Federico II.

Courses in the Bachelor and Master degree

- 2021 to present: teaching of course '*Fondamenti di Geotecnica*' in the Bachelor degree of "Civil Engineering" and Environmental Engineering at University of Naples Federico II.
- 2022 to present: teaching of course '*Laboratorio di Calcolo*' in the Bachelor degree of "Civil Engineering" at University of Naples Federico II.
- 2024 to present: teaching of course '*Geotechnical Modeling*', in the Master degree of "Civil Engineering" and Environmental Engineering at University of Naples Federico II.
- 2013: teacher of the course 'Modélisation des Structures Geotechniques' within the Master 1, in the faculty of Civil Engineering in Joseph Fourier University (Grenoble, FR).
- 2015 - 2017: teaching assistant in the Master program of Northwestern University (United States) within the Department of Civil and Environmental Engineering: Failure theories in Geomechanics, Unsaturated Soil Mechanics and Constitutive Modeling for Soils.

Teaching abroad

- 2013: teacher of the course '*Modélisation des Structures Geotechniques*' within the Master 1, in the faculty of Civil Engineering in Joseph Fourier University (Grenoble, FR). In French.
- 2015 - 2017: teaching assistant in the Master program of Northwestern University (United States) within the Department of Civil and Environmental Engineering: *Failure theories in Geomechanics*, *Unsaturated Soil Mechanics* and *Constitutive Modeling for Soils*. In English.

Co-supervised students

- 2022, Luigi Bruno, *Meccanismi di collasso di pozzi di grande dimensione per la stabilizzazione di frane profonde*, University of Naples Federico II.
- 2021, Gloria Pagliaricci, *Numerical and constitutive modeling of ribbed piles in over-consolidated clay*, Research project, University of Rome Tor Vergata.
- 2019, Eusebio Cefarino, *An elasto-plastic model for over-consolidated clay based on critical state theory*, Research project, University of Madrid (in collaboration with CEDEX).
- 2019, Nicolas Zalamea V., *A Hoek & Brown model with softening behaviour: numerical and theoretical studies*, Research project, Master 2 at University Joseph Fourier (Laboratory 3SR).
- 2016, Yanni Chen, *Numerical modeling of unsaturated porous media*, Ph.D. student at Northwestern University.
- 2015, Ghassan Shahin, *Numerical modeling of compaction banding*, Ph.D. student at Northwestern University.
- 2013, Ekaterina Panteleeva, *Numerical computations of strain localization with an elasto-plastic constitutive law*, Research project, Master 2 at University Joseph Fourier (Laboratory 3SR).
- 2011 Rong Hu, *Étude Numérique d'un modèle Élasto-Plastique Anisotrope*, Research project Master 1 at Institut National Polytechnique de Grenoble.

DEPARTMENTAL ACTIVITIES

2023 to present

Member of the committee of the international degree program in "Civil and Evironmental Engineering" at University of Naples Federico II, in the Department of Civil, Architectural and Environmental Engineering (DICEA).

2022

Member of the committee of the Mediterranean Ph.D. School organized at University of Naples Federico II, in the Department of Civil, Architectural and Environmental Engineering (DICEA).

PUBLICATIONS

Journal papers

1. L. Mele, F. Marinelli, S. Lirer and A. Flora. Model prediction of cyclic liquefaction resistance of gassy soils. *Acta Geotechnica*, 2022.
2. Y. Xianda, F. Marinelli, and G. Buscarnera. Constitutive modeling of structured granular materials with anisotropic grain skeleton and cement bonds. *Acta Geotechnica*, 17(12), 5465-5479, 2022.
3. G. Shahin, A. Papazoglou, F. Marinelli, G. Viggiani and G. Buscarnera. Experimental study of compaction localization in carbonate rocks and constitutive modeling of mechanical anisotropy. *Int. J. Numer. Anal. Methods Geomech*, 46(13), 2561-2581, 2022.
4. D. Shuttle, F. Marinelli, S. Brasile, M. Jefferies, Y. H. Ong. Discussion: Validation of computational liquefaction: 1974 Tar Island slide. *Geotechnical Research,* 9(1), 56-60, 2022.
5. D. Shuttle, F. Marinelli, S. Brasile, M. Jefferies. Validation of computational liquefaction: 1974 Tar Island slide. *Geotechnical Research,* 9(1), 32-55, 2021.
6. Y. Chen, F. Marinelli, G. Buscarnera. Influence of Clay Anisotropy on Model Simulations of Wetting Collapse. *J. of Engineering Mechanics*. 146(2) 04019130. 2020
7. G. Shahin, F. Marinelli, A. Papazoglou, C. Dano, G. Buscarnera and G. Viggiani. Simulation of localized compaction in Tuffeau de Maastricht based on evidence from X-ray tomography *Int. J. of Rock Mechanics and Mining Sciences*. 121, 104039, 2019.
8. G. Shahin, F. Marinelli, and G. Buscarnera. Viscoplastic interpretation of localized compaction creep in porous rocks. *J. of Geophysical Research: Solid Earth*, 124, 10180-10196.
9. Y. Chen, F. Marinelli, G. Buscarnera. Mathematical interpretation of delayed instability in viscous unsaturated soils. *Géotechnique Letters*. 9(3), 165-172, 2019.
10. Y. Chen, F. Marinelli, G. Buscarnera. A rotational hardening model capturing undrained failure in anisotropic soft clays. *Indian Geotechnical Journal* 2019. 49, 369–380, 2019.
11. F. Marinelli, and G. Buscarnera. Anisotropic Breakage Mechanics: From energy storage to yielding in cross-anisotropic porous rocks. 2019. *J. of the Mechanics and Physics and Solids*. 2019, 121, 1-18.
12. F. Marinelli and G. Buscarnera. A Generalized Backward Euler algorithm for the numerical integration of a rate dependent breakage model. *Int. J. Numer. Anal. Methods Geomech*. 43(1), 3-29, 2019.
13. F. Marinelli and G. Buscarnera. Instability criteria for quasi-saturated viscous soils. *Int. J. Numer. Anal. Methods Geomech*. 42(3), 379-400, 2018.
14. F. Marinelli, F. Pisanò, C. di Prisco and G. Buscarnera. Model-based interpretation of undrained creep instability in loose sands. *Géotechnique*. 68(6), 504-517, 2018.
15. F. Marinelli, B. Van den Eijnden, Y. Sieffert, R. Chambon, F. Collin. Modeling of granular solids with computational homogenization: comparison with Biot's theory. *Finite Elements in Analysis and Design*. 119, 45-62, 2016.
16. F. Marinelli and G. Buscarnera. Parameter calibration for high-porosity sandstones deformed in the compaction-localization regime. *Int. J. of Rock Mechanics and Mining Sciences*. 78, 240-252, 2015.
17. F. Marinelli, Y. Sieffert and R. Chambon. Hydromechanical modeling of an initial boundary value problem: Studies of non-uniqueness with a second gradient continuum. *Int. J. of Solids and Structures*. 54, 238-257, 2015.
18. A. Torabi, R.H. Gabrielsen, H. Fossen, P. Ringrose, E. Skurtveit, E. Ando, F. Marinelli, C. Viggiani, S. Dal Pont, S. Braathen, A.B. Hovland, P. Bésuelle, P. Alikarami, R. Zalmastra and H. Sokoutis. Strain localization in sandstone and its implications for CO_2 storage. *First Break*. 33(7), 81-92, July, 2015.
19. B. François, V. Labiouse, A. Dizier, F. Marinelli, R. Charlier and F. Collin. Hollow cylinder tests on Boom Clay: modeling of strain localization in the anisotropic Excavation Damaged Zone. *Rock Mechanics and Rock Engineering*, 47, 71-86, 2014.

Chapters in books and conference proceedings (Scopus indexed)

1. F. Marinelli, S. Dawn, S. Brasile, M. Jefferies. Liquefaction Instabilities with NorSand Plasticity: Verification and Computational Performance of Explicit Integration Algorithms. In *GeoCongress 2022*, US.
2. F. Marinelli, N. Zalamea, G. Cammarata, S. Brasile. Constitutive behaviour of brittle layered rocks using a 3D anisotropic Hoek & Brown model In *16th International Association for Computer Methods and Advances in Geomechanics, Torino, Italy 2021*, IACMAG.
3. G. Buscarnera, F. Marinelli, G. Shahin. Constitutive modeling approaches for cross-anisotropic porous rocks. In *54th US Rock Mechanics/Geomechanics Symposium, Colorado Boulder, CO, USA 2020*, ARMA.
4. N. Zalamea, F. Marinelli, R. Brinkgreve, S. Brasile. Numerical analyses of shear band failure in tunnel excavation problems using a regularized Hoek & Brown model. In *54rd US Rock Mechanics/Geomechanics Symposium, Colorado Boulder, CO, USA 2020*, ARMA.
5. F. Marinelli, N. Zalamea, G. Vilhar, S. Brasile, G. Cammarata, R. Brinkgreve. Modelling of brittle failure based on Hoek & Brown yield criterion: parametric studies and constitutive validation. In *53th US Rock Mechanics/Geomechanics Symposium, New York, NY, USA 2019*, ARMA.
6. Z. Shi, F. Marinelli, G. Buscarnera. Modeling delayed liquefaction after cyclic loading. In *Geotechnical Earthquake Engineering and Soil Dynamics, Austin, TX, USA*, 2018.
7. F. Marinelli, Y.D. Zhang and G. Buscarnera. Compaction localization in granular rocks: modeling grain-size effects. In *51th US Rock Mechanics/Geomechanics Symposium, San Francisco, CA, USA 2017*, ARMA 17-569.
8. A. Papazoglou, G. Shahin, F. Marinelli, C. Dano, G. Buscarnera and G. Viggiani. Localized compaction bands in Tuffeau de Maastricht: experiments and modeling. In *Bifurcation and Degradation of Geomaterials with Engineering Applications*, 481-488 2017.
9. F. Marinelli, Y. Sieffert and R. Chambon. Hydromechanical modeling with second gradient continuum: Non-uniqueness studies. In *Advances in Bifurcation and Degradation in Geomaterials*, 9 47-52, 2015.
10. Y. Sieffert, F. Marinelli and R. Chambon. Local second gradient models for thermo-hydro-mechanical coupling in rock like materials. In *Advances in Bifurcation and Degradation in Geomaterials*, 11 219-226, 2011.

Papers in conference proceedings (not indexed)

1. F. Marinelli, S. Ghassan, A. Papazoglou, C. Viggiani, G. Buscarnera. Caratterizzazione sperimentale e comportamento costitutivo di una roccia carbonatica anisotropa. In *Incontro Annuale dei Ricercatori di Geotecnica, 2022*, IARG.
2. L. Lalicata, G. Pagliaricci, F. Marinelli, F. Casini. Alcuni aspetti del comportamento dei pali costolati. In *Incontro Annuale dei Ricercatori di Geotecnica, 2021*, IARG.
3. F. Marinelli, Y. Sieffert and R. Chambon. Two-scale model for hydro-mechanical damage model. In *Flows and mechanics in natural porous media from pore to field scale, Pore2Field. Les Rencontres scientifiques d'IFP Energies nouvelles*, 16-18 November, 2011.

PRESENTATIONS

Presentations in international conferences

1. 2018 June. US Rock Mechanics/Geomechanics, New York, US. Modelling of brittle failure based on Hoek & Brown yield criterion: parametric studies and constitutive validation. Marinelli F., Zalamea N., Brasile S., Cammarata G., Brinkgreve R.
2. 2017 June. Engineering Mechanics Institute Conference, San Diego University. Simulation of delayed liquefaction in loose sands. Marinelli F., Buscarnera G.
3. 2015 June. Engineering Mechanics Institute Conference, Standford University. Geomechanical modeling of localized compaction in high porosity rocks. Marinelli F., Buscarnera G.
4. 2013 October. Alert Geomaterials, Aussois, France. Poster presentation, Localization patterns of an hollow cylinder test. Marinelli F., Sieffert Y., René C.
5. 2013 September. First International workshop for finite element program Lagamine, Liège, Belgium. Hydromechanical modeling with second gradient continuum: Non-uniqueness studies. Marinelli F., Sieffert Y., René C.
6. 2013 January. Couplage Multi Physique et Multi Echelle en Mécanique géo-environnementale. Modélisation multi-échelle de l'endommagement hydroméchanique: méthode des éléments finis au carré. Marinelli F., Chambon R.
7. 2011 November. IFP Energie Nouvelles, France, Paris. Two-scale model for the hydro-mechanical damage model. Marinelli F., Sieffert Y., René C.

PEER-REVIEW ACTIVITIES

Reviewer for international journals

– Acta Geotechnica, Computer and Geotechnics, Finite element in analysis and design, Geomechanics for Energy and Environment, Géotechnique Letters, International Journal of Rock Mechanics and Science Mining, Journal of Engineering Mechanics, Journal of Mechanical Engineering Reaserch.

Reviewer for international conferences

– GEO-CONGRESS 2022 (Geophysical and Earthquake Engineering and Soil Dynamics), in Charlotte, North Carolina, United States, March 2022.
– ARMA (American Rock Mechanics Association, ARMA), 54th US Rock Mechanics/Geomecanics Conference, in Colorado, United States, June 2020.
– ARMA (American Rock Mechanics Association, ARMA), 53 rd US Rock Mechanics/Geomecanics Conference, in New York, United States, June 2019.
– GEESD (Geotechnical Earthquake Engineering and Soil Dynamics), 5th Conference held in Austin (TX), United States, June 2018.
– ARMA (American Rock Mechanics Association, ARMA), 51st US Rock Mechanics/Geomecanics conference, in San Francisco, United States, June 2017.
– PANAM-UNSAT, 2nd Pan American Conference on Unsaturated Soils, Dallas, Texas, United States, November 2017.
– EMI (Engineering Mechanics Institute), San Diego, 2017.
– GEO-CHICAGO 2016 (Geophysical and Earthquake Engineering and Soil Dynamics), in Chicago, Illinois, United States, March 2016
– EMI (Engineering Mechanics Institute), Standford University, San Francisco 2015.
– Reviewer for the Research Grant Council of Honk-Hong (2016).

SHORT BIO AND RESEARCH INTEREST

Short bio

Marinelli Ferdinando did his PhD at University of Grenoble with the supervision of prof. René Chambon and prof. Yannick Sieffert. They investigated different constitutive approaches to describe the coupled behaviour of geomaterials. Specifically, two approaches have been explored, the former one based on the elasto-plastic theory with which an hydromechanic IBVP has been solved, while the latter based on computational homogenization approach validated through a comparison with the consolidation theory of Biot.
During his research activities, particular focus has been dedicated to the numerical modeling of localized and diffuse failure processes in high-porosity geomaterials. This topic has been investigated during a post-doctoral position in Northwestern University (United States) where emphasis has been given to the phenomenon of shear/compaction localization in high-porosity rocks, as well as to the onset of flow failure in quasi-saturated shallow sediments. To study the physics of these problems advanced models have been used based on critical state plasticity and a new constitutive framework for granular solids referred to as Breakage Mechanics. In particular, to investigate the potentialities of the critical state theory in the modeling of localization phenomena, the classical bifurcation criterion of Rice was used as a further tool to optimize and constrain a set of constitutive parameters for the proposed model. In this framework, a second gradient continuum was considered to suppress the mesh-dependency of the computed solution when strain localization develops in the simulated samples. To explain the role of time-dependency on the inception of different failure modes, a viscous version of both the critical state theory and the Breakage Mechanics was introduced in our numerical models by considering a Perzyna-like approach. In both cases, the integration of the stress at the end of a given time step is performed by means of a fully implicit algorithm (i.e., a generalized Backward Euler algorithm) which was adapted to the aforementioned rate-dependent approaches due to its properties of stability and accuracy for large time steps. By using these numerical tools, instability criteria for viscous materials were formulated to investigate delayed failures promoted by a wide range loading paths. In particular, a set of concepts already used in the past only for monophasic materials, has been extended to the more general case of multiphase materials characterized by varying degrees of saturation. In this manner, different scenarios can be explored to evaluate the likelihood of unstable phenomena, giving particular emphasis to mechanisms of failure relevant for life-threatening natural hazards, such as liquefaction events and undrained creep instabilities.
Thanks to his extended experience in computational mechanics he gained a position within a world wide recognized software company (Plaxis bv) developing an advanced Finite Element Method to simulate complex geotechnical problems. During these years a model to simulate brittle failure in rocks based on the Hoek & Brown criteria has been implemented within the PLAXIS framework. This work was presented in the 53rd symposium organized by American Rock Mechanics Association in 2019 in New York (United States). A further implementation to enrich the set of constitutive models in PLAXIS was addressed to an advanced approached aimed to deal liquefaction instability in loose deposit. The model, known in literature as NorSand, has been validated at the material point level through the integration of multiple stress paths and used to simulate the failure of a tailing dam occurred in Tar Island (Canada) in 1974. Results from his research have produced 14 articles in peer-reviewed international journals, 10 proceedings at international conferences on geotecnics and rock mechanics. He is currently Assistant Professor in Geotechnics at the University of Napoles Federico II and he is teaching Soil Mechanics to undergraduated students. He gained the national scientific qualification for Associate Professor in 2021.