Konstantinos Karapiperis

Curriculum Vitae

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Personal details

Birth	02/08/1989
Gender	Male
Citizenship	Greek

Education

2015 – 2020 (Sep. – Dec.) **California Institute of Technology, USA**
PhD in Applied Mechanics, GPA: 4.0/4.0.
Thesis: Multiscale, data-driven and nonlocal modeling of granular materials
Focus areas: Discrete/Finite Element Modeling, Thermodynamically consistent data-driven computing, Nonlocal continua, Complex networks, Extraterrestrial applications of granular mechanics, Bonded particle mechanics
Minor in Applied and Computational Mathematics.
Focus areas: Optimization, Probability, Machine learning

2013 – 2015 (Sep. – June) **University of California, Davis, USA**
MSc in Civil Engineering, GPA: 4.0/4.0.
Thesis: Intrusive stochastic inelasticity of materials
Highlights: Development of nonlinear and non-Gaussian stochastic Finite Element framework, Formulation and solution of Fokker-Planck-Kolmogorov equations for probabilistic elastoplasticity, Stochastic dynamic simulation for prediction of seismic ground motion

2007 – 2012 (Sep. – Nov.) **National Technical University of Athens, Greece**
Diploma in Civil Engineering (MSc equivalent), GPA: 9.0/10.
Thesis: Insight to the numerical modeling of caisson foundations

Research Profile

My current interest lies in the intersection of mechanics and applied mathematics, in particular the modeling, simulation and design of complex materials and systems aided by multiscale, stochastic and data-driven techniques.

Experience

2021 – 2021 (Apr. – May) **Marie-Curie Postdoctoral Fellow** *ETH Zurich*.

2021 – 2021 (Jan. – Apr.) **Visiting Postdoctoral Scholar** *Caltech*.

2015 – 2020 (Sep. – Dec.) **Graduate Student Researcher** *Caltech*.

2017 – 2019 **Teaching Assistant** *Caltech*, Static and Dynamic Failure of Brittle Solids and Interfaces (Ae 265 a/b), Mechanics and Rheology of Porous media (Ce 163), Plasticity (Ae 223).

2013 – 2015 (Sep. – May) **Graduate Student Researcher** *UC Davis*.

2014 – 2014 (Jan. – Apr.) **Teaching Assistant** *UC Davis*, Mechanics and Statics of Materials (Eng 104).

2012 – 2013 (Sep. – June.) **Greek Army, Corps of Engineers**.

2011 – 2011 (Jun. – Aug.) **Archirodon N.V** *Athens*, Greece.
Construction Support Engineer

Scholarships and Awards

2021 **Marie Sklodowska-Curie Individual Fellowship**.

2021 **Postdoctoral Fellowship (ETH) - Waived**.

2018 **Hartley Fellowship (Caltech)** *(1 annual recipient in Mechanical and Civil Engineering)*.

2015 **Applied Mechanics Option Fellowship (Caltech)**.

2013 **Fullbright Scholarship** *(Withdrawn)*.

State Scholarship Foundation Academic Merit Awards (NTUA).

2012 *Highest performance in 9th semester.*

2011 *Highest performance in 7th-8th semester.*

2008 *Highest performance in math courses.*

2008 *Highest performance in 1st-2nd semester.*

2007 *Admission to NTUA with honors.*

Refereed Publications

Published

Aug. 2021 Li L., **Karapiperis K.**, Andrade J.E. "Emerging contact force heterogeneity in ordered soft granular media", *Mechanics of Materials (2021)*.

Aug. 2021 **Karapiperis K.,** Ortiz M., Andrade J.E. "Data-Driven Nonlocal Mechanics: Discovering the Internal Length Scales of Materials", *Computer Methods in Applied Mechanics and Engineering (2021)*.

Aug. 2020 **Karapiperis K.,** Stainier L., Ortiz M., Andrade J.E. "Data-Driven Multiscale Modeling in Mechanics", *Journal of the Mechanics and Physics of Solids (2020)*.

Aug. 2020 **Karapiperis K.**, Andrade J.E. "Nonlocality in Granular Complex Networks: Linking Topology, Kinematics and Forces", *Extreme Mechanics Letters (2020)*.

July 2020 Harmon J., **Karapiperis K.**, Li L., Moreland, S., Andrade J.E. "Particle Bonding within the Level Set Discrete Element Method for Modeling Connected Granular Media", *Computer Methods in Applied Mechanics and Engineering (2020)*.

July 2020 **Karapiperis K.**, Harmon J., Andò E., Viggiani G., Andrade J.E. "Investigating the Incremental Behavior of Granular Materials with the Level-Set Discrete Element Method", *Journal of the Mechanics and Physics of Solids (2020)*.

May 2020 Bhattacharya D., Kawamoto R., **Karapiperis K.**, Andrade J.E., Prashant A. "Mechanical Behaviour of Granular Media in Flexible Boundary Plane Strain conditions: Experiment and Level-Set Discrete Element Modelling", *Acta Geotechnica (2020)*.

Oct. 2019 **Karapiperis K.**, Marshall, J.P, Andrade J.E. "Reduced gravity effects on the strength and flow of granular matter: DEM simulations vs experiments", *Journal of Geotechnical and Geoenvironmental Engineering (2019)*.

May 2016 **Karapiperis K.**, Sett K., Kavvas M.L., Jeremic B. "Fokker-Planck Linearization for non-Gaussian Stochastic Elastoplastic Finite Elements", *Computer Methods in Applied Mechanics and Engineering (2016)*.

July 2015 Zafeirakos Th, Gerolymos N., **Karapiperis K.** "Generalized failure envelope for embedded foundations in cohesive soil: Static and dynamic loading", *Soil Dynamics and Earthquake Engineering (2015)*.

Nov. 2013 **Karapiperis K.**, Gerolymos N. "Combined Loading of Caisson Foundations in Cohesive Soil: Finite Element versus Winkler Modeling", *Computers and Geotechnics (2013)*.

Conferences and Seminars

Conferences

Sept. 2021 Andrade J.E., **Karapiperis K.**, Stainier L and Ortiz M. "Data-Driven Multiscale Computing in Mechanics", *COMPLAS, Barcelona, Spain, September 7-9, 2021.*

May 2021 **Karapiperis K.**, Stainier L, Ortiz M. and Andrade J.E. "Data-Driven Modeling in Granular Mechanics", *Engineering Mechanics Institute Conference, New York, NY, May 25-28, 2021.*

June 2020 Jostad H.P., Khoa H.D.V., **Karapiperis K.** and Andrade J.E. "Can LS-DEM be used to simulate cyclic behavior of sand?", *International Conference of the International Association for Computer Methods and Advances in Geomechanics, Turin, IT, June 30, 2020.*

June 2019 **Karapiperis K.**, Andrade J.E. "Incremental elastoplastic response of granular materials via virtual stress probing", *Engineering Mechanics Institute Conference, Pasadena, CA, June 18-21, 2019.*

July 2018 **Karapiperis K.**, Andrade "The Elusive Granular Length Scale: Continuum vs Discrete", *World Congress of Computational Mechanics, New York, NY, July 22-27, 2018.*

June 2018 **Karapiperis K.**, Andrade "Towards a physical description of granular length scales: Discrete and enhanced continuum juxtaposed", *Engineering Mechanics Institute Conference, Cambridge, MA, May 29-June 1, 2018.*

June 2017 **Karapiperis K.**, Andrade, J.E, Marshall J.P. "Reduced gravity effects on the failure and flow of sand: DEM simulations vs experiments", *Engineering Mechanics Institute Conference, San Diego, CA, June 4-7, 2017.*

Nov. 2015 **Karapiperis K.**, Watanabe K., Luo C., Abell J., Pisano F., Sett K., Jeremic B. "On Uncertainties and Seismic Ground Motions Modeling and Simulation", *6th International Conference on Earthquake Geotechnical Engineering, Christchurch, New Zealand, Nov 1-4, 2015.*

May 2015 Jeremic B., Sett K., **Karapiperis K.**, Abell J. "Dynamics of Soils and Structures under Uncertainty", *1st International Conference on Uncertainty Quantification in Computational Sciences and Engineering, Crete, Greece, May 22-25, 2015.*

May 2015 **Karapiperis K.**, Jeremic B., Sett K. "A meshless radial basis function solution to the Fokker-Planck-Kolmogorov Equations of Probabilistic Elastoplasticity", *1st International Conference on Uncertainty Quantification in Computational Sciences and Engineering, Crete, Greece, May 22-25, 2015.*

Invited talks

May 2019 **Karapiperis K.** "Lessons from virtual experiments on sands: Mapping the granular genome", *Knowles Solid Mechanics Symposium, Caltech, Pasadena, CA, May 17, 2019.*

Sep. 2015 **Karapiperis K.** "Stochastic Plasticity and Dynamics", *Department of Civil Engineering Special Seminar, NTUA, Athens, Greece, Sep 7, 2015.*

Student Mentoring Experience

2019 – 2019 (June – Aug.) **Eleni Blatsouka**, Summer research fellow - Caltech,
Project: Stability of entangled granular structures under vibration.

2017 – 2017 (June – Aug.) **Debayan Bhattacharya**, Visiting graduate student - Caltech,
Project: Instabilities in granular matter confined by flexible boundaries.

Funding proposal experience

National Science Foundation (U.S.A), 2020,
Project: Fabric and cyclic response of granular materials.
Jointly with Prof. J.E. Andrade, Granted Dec. 2020

Computer Skills

Languages: *C++, Python, Matlab, Mathematica.*
Numerical analysis: *ABAQUS, SAP, Plaxis.*
Machine learning: *Tensorflow, Keras.*
Misc: *AutoCAD, Linux, LaTeX, MS Office.*

Languages

Greek *Native speaker.*
English *Excellent (C2: Proficiency of Cambridge/Michigan, ETS TOEFL/GRE).*
German *Fluent (C1: Zentrale Mittelstufenprufung Zeugnis).*

Affiliations

American Society of Civil Engineers (ASCE).
American Physical Society (APS).
Society of Industrial and Applied Mathematics (SIAM).
Technical Chamber of Greece (TEE).
Reviewer for Acta Geotechnica.