Giacomo Po, PhD

Education

University of California Los Angeles (UCLA), Los Angeles CA

Ph.D., Mechanical Engineering, May 2011

- Major Field: Structural and Solid Mechanics
- Dissertation: "A Computational Model for Discrete-to-Continuum Dislocation-Based Crystal Plasticity"
- Advisor: Professor Nasr M. Ghoniem

M.S., Mechanical Engineering, Dec 2007

University of Bologna, Bologna Italy

B.S., Mechanical Engineering, *Summa cum Laude* April 2004

Licenza, Collegio Superiore of the University of Bologna March 2004

Academic Appointments

Assistant Professor 2019 - present
Department of Mechanical and Aerospace Engineering, University of Miami
Research interests: computational mechanics of materials and their defects. Modeling of materials microstructures in relationship to macroscopic properties. Discrete and continuum dislocation-based plasticity of metals and ceramics. High temperature structural materials, high strain rate loading, materials in extreme environments.

Project Scientist & Lecturer Sep. 2012 - 2018
Department of Mechanical and Aerospace Engineering, UCLA
Instructor several graduate and undergraduate courses, including Elasticity, Introduction to Computer Aided Design and Drafting, Statics and Strength of Materials, Advanced Strength of Materials, and Introduction to Machines and Mechanisms.

Postdoctoral Researcher May 2011 to 2015
Department of Mechanical and Aerospace Engineering, UCLA

Professional Service

Editorial Boards

- Materials Theory

Referee Service

- International Journal of Plasticity
- Journal of Nuclear Materials
- Journal of the Mechanics and Physics of Solids
- Advances in Condensed Matter Physics
- International Journal of Mechanical Sciences
- Modelling and Simulation in Materials Science and Engineering
- Acta Materialia
- Materials Theory

Professional Experience

Mechanical Engineer
Ferrari S.p.A., Italy 2004-2006
Combustion and air/fuel management, misfire detection, patented knock control methods based on ion current sensors.

Scientific Software

MoDELib, The Mechanics of Defects Evolution Library, is an open-source c++ library to simulate the collective dynamics of defects in crystalline materials.

Publications

Book Chapters

[1] Jaime Marian, Steve Fitzgerald, Giacomo Po. Discrete dislocation dynamics to simulate irradiation hardening: current capabilities, applications, and research needs. In *Handbook of Materials Modeling*, edited by Sindey Yip, Springer, 2018.
https://www.springer.com/us/book/9783319446790

[2] Anter El-Azab and Giacomo Po. Continuum Dislocation Dynamics: Classical Theory and Contemporary Models. In *Handbook of Materials Modeling*, edited by Sindey Yip, Springer, 2018.
https://www.springer.com/us/book/9783319446790

Journal Articles

[3] Markus Lazar, Eleni Agiasofitou, and Giacomo Po. Three-dimensional nonlocal anisotropic elasticity: a generalized continuum theory of Angström-mechanics. Acta Mechanica (accepted manuscript)

[4] Yinan Cui, Giacomo Po, Pratyush Srivastava, Katherine Jiang, Vijay Gupta, Nasr Ghoniem. The role of slow screw dislocations in controlling fast strain avalanche dynamics in body-centered cubic metals. (accepted in IJP).
https://doi.org/10.1016/j.ijplas.2019.08.008

[5] G. Sparks, Y. Cui, G. Po, Q. Rizzardi, J. Marian, R. Maaß. Avalanche statistics and the intermittent-to-smooth transition in microplasticity. Physical Review Materials 3(8), 2019:
https://link.aps.org/doi/10.1103/PhysRevMaterials.3.080601

[6] Giacomo Po, Nikhil Chandra Admal, Bob Svendsen. Non-local thermoelasticity based on equilibrium statistical thermodynamics. Journal of Elasticity 2019 1-23,
https://doi.org/10.1007/s10659-019-09745-9

[7] Giacomo Po, Markus Lazar. The Green tensor of Mindlin's anisotropic first strain gradient elasticity. Materials Theory 3(1) (2019), 3.
https://doi.org/10.1186/s41313-019-0015-2

[8] Yinan Cui, Giacomo Po, Yves-Patrick Pellegrini, Markus Lazar, Nasr Ghoniem. Computational 3-dimensional dislocation elastodynamics. Journal of the Mechanics and Physics of Solids 126, (2019), 20-51
https://doi.org/10.1016/j.jmps.2019.02.008

[9] Markus Lazar, Giacomo Po. On Mindlin's isotropic strain gradient elasticity: Green tensors, regularization, and operator-split. Journal of Micromechanics and Molecular Physics 3(4), 1840008 (2018).
https://doi.org/10.1142/S2424913018400088

[10] Giacomo Po, Yue Huang, Nasr Ghoniem. A continuum dislocation model of wedge micro-indentation. *International Journal of Plasticity* 114 (2019), 72-86.
https://doi.org/10.1016/j.ijplas.2018.10.008

[11] Andrew Sheng, Nasr Ghoniem, Tamer Crosby, Giacomo Po. A mesh-independent method for three-dimensional crack growth in finite geometry. International Journal for Numerical Methods in Engineering 117(1), 2019, 38-62.
https://doi.org/10.1002/nme.5946

[12] Yinan Cui, Giacomo Po, Nasr Ghoniem. Size-tuned plastic flow localization in irradiated materials at the sub-micron scale. PRL 120(21), 2018, 215501.
10.1103/PhysRevLett.120.215501

[13] Y Cui, G. Po, N.M. Ghoniem. Suppression of Localized Plastic Flow in Irradiated Materials. Scripta Materialia 54, 2018, 34-39.
https://doi.org/10.1016/j.scriptamat.2018.04.046

[14] Y. Cui, G. Po, N.M. Ghoniem. A dislocation dynamics model coupled with barrier field. International Journal of Plasticity 104, 2018, 54-67.
https://doi.org/10.1016/j.ijplas.2018.01.015

[15] Nikhil Chandra Admal, Giacomo Po, Jaime Marian. A unified framework for polycrystal plasticity with grain boundary evolution. International Journal of Plasticity 106 (2018), 1-30.
https://doi.org/10.1016/j.ijplas.2018.01.014

[16] Giacomo Po, Markus Lazar, Nikhil Chandra Admal, Nasr Ghoniem. An anisotropic non-singular theory of dislocations. International Journal of Plasticity 103 (2018), 1-22.
https://doi.org/10.1016/j.ijplas.2017.10.003

[17] Can Erel, Giacomo Po, Tamer Crosby, and Nasr Ghoniem. Generation and Interaction Mechanisms of Prismatic Dislocation Loops in FCC Metals. Computational Materials Science 140, 2107
https://doi.org/10.1016/j.commatsci.2017.07.043

[18] Nikhil Chandra Admal, Giacomo Po and Jaime Marian. Diffuse-interface polycrystal plasticity: expressing grain boundaries as geometrically necessary dislocations. Materials Theory 2017, 1:6
https://doi.org/10.1186/s41313-017-0006-0

[19] Can Erel, Giacomo Po, Nasr Ghoniem. Dependence of Hardening and Saturation Stress in Persistent Slip Bands on Strain Amplitude During Cyclic Fatigue Loading. Philosophical Magazine, 2017, 1-24.
https://doi.org/10.1080/14786435.2017.13615550

[20] Yinan Cui, Giacomo Po, Nasr Ghoniem. Does irradiation enhance or inhibit strain bursts at the submicron scale? Acta Materialia 132, 2017, 285-297.
https://doi.org/10.1016/j.actamat.2017.04.055

[21] Yinan Cui, Giacomo Po, and Nasr Ghoniem. Influence of loading control on strain bursts and dislocation avalanches at the nano- and micro-scale. Physical Review B. 2017, 95, 064103.
https://doi.org/10.1103/PhysRevB.95.064103

[22] David Rivera, Edward Gao, Yue Huang, Giacomo Po, Nasr M. Ghoniem. A Dislocation-Based Crystal Viscoplasticity Model with Application to Micro-engineered Plasma-Facing Materials. Journal of Nuclear Materials 485, 2017, p 231-242.
http://dx.doi.org/10.1016/j.jnucmat.2016.12.034

[23] Nikhil Chandra Admal, Jaime Marian, Giacomo Po. The atomistic representation of first strain-gradient elasticity tensors. JMPS 99, 2107, 93-115.
http://dx.doi.org/10.1016/j.jmps.2016.11.005

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https://doi.org/10.1103/PhysRevLett.117.155502

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http://dx.doi.org/10.1016/j.actamat.2016.08.016

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http://www.ccsenet.org/journal/index.php/jmsr/article/view/61689

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http://www.insajournals.in/insaj/index.php/proceedings/article/view/93/82

[28] Yinan Cui, Giacomo Po, Nasr Ghoniem. Temperature insensitivity of the flow stress in body-centered cubic micropillar crystals. Acta Materialia 108, 128-137 (2016).
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http://dx.doi.org/10.1088/0965-0393/23/8/085003

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http://dx.doi.org/10.4028/www.scientific.net/AMM.553.28

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http://dx.doi.org/10.1016/j.jmps.2014.03.005

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http://dx.doi.org/10.1016/j.jnucmat.2014.05.045

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http://dx.doi.org/10.1016/j.jmps.2014.01.012

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http://dx.doi.org/10.1063/1.4863720

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http://dx.doi.org/10.1016/j.physleta.2013.12.018

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http://dx.doi.org/10.1063/1.4793646

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http://dx.doi.org/10.1016/j.jnucmat.2012.10.039

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http://dx.doi.org/10.1016/j.jnucmat.2013.03.045

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http://dx.doi.org/10.1063/1.3359654

Conference Proceedings

[46] Giacomo Po and Nasr Ghoniem. Modeling of Dislocation Microstructure Evolution In Microindentation Experiments. *Proc. of the International Symposium on Plasticity and Its Current Applications*, Jan 3-8 2012, San Juan, Puerto Rico.

[47] Giacomo Po and Nasr Ghoniem. Modeling and Finite Element Simulation of Dislocation Density Evolution in Microindentation Experiments. *Proc. of the 11th US National Congress on Computational Mechanics*, July 25-28 2011, Minneapolis.

[48] Giacomo Po and Nasr Ghoniem. Atomically-Constrained Dislocation Dynamics. *Proceedings of the 5th international conference on Multiscale Materials Modeling*, October 4-8 2010, Freiburg, Germany.

[49] Giacomo Po and Nasr Ghoniem. Continuum Theory of Dislocations: Finite Element Simulations of Microstructure Evolution during Micro-Indentation. *Proc. of the 5th international conference on Multiscale Materials Modeling*, October 4-8 2010, Freiburg, Germany.

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[51] N. Cavina, G. Po, L. Poggio, Ion Current based Spark Advance Management for Maximum Torque Production and Knock Control. *Proc. of 8th biennial ASME Conference on Engineering Systems Design and Analysis*, July 4-7 2006, Turin, Italy.