PROF. CHRISTIAN PECO

Assistant Professor at Engineering Science and Mechanics, Penn State. We develop and apply computational models to answer fundamental scientific questions in exotic materials. Currently, we explore the emergent behavior of biological networks for AI, the mechanics of nano-enriched ice for ultrasonic evaluation of AM high-performance parts, and high performance computing for fracture mechanics in complex microstructures.

CONTACT

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Google Scholar, h-ind 09, 635 cit, 11/2022

SKILLS

Programming

Python
Bash
C++
LaTeX

Operating Systems

Linux
MacOS
Windows

Software & Tools

Visualisation
(e.g. matplotlib, Paraview, ...)
Data handling/analysis
(e.g. numpy, scipy, pandas, ...)
FEM
(e.g. MOOSE, COMSOL, ...)
AI
(e.g. Tensorflow II, pytorch, ...)

Languages

Spanish
Catalan
English
French
Japanese

PROFESSIONAL MEMBER

American Society of Mechanical Eng.
US Assoc. of Computational Mechanics
Society of Engineering Science
Spanish Society for Num. Methods in Eng.
International Association for Numerical Methods in Enginnering.

WORK HISTORY

01/2018 - present Penn State, USA	Assistant Professor
11/2016 - present Riken/Nagoya University, Japan	Research Collaborator
11/2015 - 11/2017 Duke university, USA	Postdoctoral Associate
10/2016 - 11/2017 Idaho National Lab, USA	Research Collaborator
10/2016 - 11/2017 Okinawa institute of Technology, Japan	Postdoc Research Collaborator
01/2015 - 11/2015 Universidad de Chile, Chile	Part-time Professor
01/2010 - 11/2014 Lacan, UPC-BarcelonaTech, Spain	Ph.D. Candidate, Teaching Assistant

EDUCATION

2019 - 2014
University Politecnica de Catalunya-BarcelonaTech
Ph.D. in Computational Mechanics
Soft Matter Mechanics, Cum Laude

2009
University Politecnica de Catalunya-BarcelonaTech
B.S. and M.S. in Civil Engineering
Numerical methods and structures

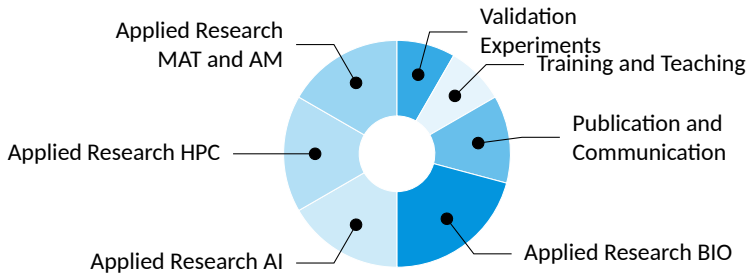
SELECTED ACHIEVEMENTS, HONOURS AND AWARDS

- Featured Paper in Soft Matter Cover (13, 5832-5841)
- 2014 Best Doctoral Thesis in Numerical Methods in Spain
- Extraordinary Award for the 2014 Best Doctoral Thesis at UPC

GENERAL SKILLS

Continuum Mechanics | Solid and Fluid Mechanics | Parallel Computing | Phase-field methods | Finite Elements | Meshfree methods | AI/ML

LABORATORY OF COMPUTATIONAL BIOMACHINERY AND NANOMATERIALS



SELECTED PUBLICATIONS

Eulerian finite volume method using Lagrangian marker particles with Reference map for incompressible fluid–structure interaction problems.

T. Shimada (Author - Co-advised Student), K. Nishiguchi, C. Peco (Author), S. Okazawa, M. Tsubokura

2022 International Journal for Numerical Methods in Engineering. Submitted 2022

Experimentally validated models of ultrasonic attenuation in digitally reconstructed polycrystalline microstructure.

Trautman, E., Wells, K., Ghanbari, F. (Author - Graduate Student), Wheatley, C., Peco, C. (Author), Simonetti, F., Arguelles, A. P.

2022 Journal of the Acoustical Society of America. Submitted 2022

Influence of impedance gradient distribution on the propagation of waves in polycrystalline ice. Journal of the Mechanics and Physics of Solids.

Ghanbari, F. (Primary Author - Graduate Student), Rodriguez, E. (Secondary Author - Graduate Student), Arguelles, A. P., Peco, C. (Corresponding Author)

2022 Finite Elements in Analysis and Design. Submitted 2022

I-STL2MOOSE: from STL data to integrated volumetrical meshes for MOOSE.

Sgarrella, J. (Primary Author - Graduate Student), Ghanbari, F. (Secondary Author - Graduate Student), Peco, C. (Corresponding Author)

2022 SoftwareX. Submitted 2022

Eulerian unified formulation for fluid-structure interaction problems using marker particles with Reference map.

T. Shimada (Author - Co-advised Student), K. Nishiguchi, C. Peco (Author), S. Okazawa, M. Tsubokura

2022 Transactions of the Japan Society for Computational Engineering and Science 2022, 20220002

Eulerian formulation using Lagrangian marker particles with reference map technique for fluid-structure interaction problem.

T. Shimada (Author - Co-advised Student), K. Nishiguchi, C. Peco (Author), S. Okazawa, M. Tsubokura

2021 9th edition of the International Conference on Computational Methods for Coupled Problems in Science and Engineering

Phase-field modeling of constrained interactive fungal networks.

Ghanbari, F. (Author - Graduate Student), Costanzo, F., Hughes, D., Peco, C. (Corresponding Author)

2020 Journal of the Mechanics and Physics of Solids 145, 104160.

A fully coupled mixed finite element method for surfactants spreading on thin liquid films.

J. Liu, C. Peco, C. Rhea, and J. E. Dolbow.

2019 Computer Methods in Applied Mechanics and Engineering, 345, 429–453

Models and simulations of surfactant-driven fracture in particle rafts.

C. Peco, J. Liu, C. Rhea, and J. E. Dolbow

2019 International Journal of Solids and Structures, 156-157, Pages 194–209

Influence of surface tension in the surfactant-driven fracture of closely-packed particulate monolayers.

Peco, C. (Primary Author), Chen, W., Liu, Y., Bandi, M., Dolbow, J. E., Fried

2017 Soft Matter 13(35), 5832-5841.

Pellet cladding mechanical interaction modeling using the extended finite element method.

Spencer, B. W., Jiang, W., Dolbow, J. E., Peco, C. (Author)

2016 INL/CON-16-37676 . Idaho National Lab.(INL), Idaho Falls, ID (United States).

A stabilized formulation with maximum entropy meshfree approximants for viscoplastic flow simulation in metal forming.

Greco, F., Filice, L., Peco, C. (Author), Arroyo, M.

2015 International Journal of Material Forming 8(3), 341-353.

Efficient implementation of Galerkin meshfree methods for large-scale problems with an emphasis on maximum entropy approximants.

Peco, C. (Primary Author), Millan, Daniel, Rosolen, A., Arroyo, M.

2015 Computers Structures 150, 52-62.

Fracture toughening and toughness asymmetry induced by flexoelectricity.

Abdollahi, A., Peco, C. (Author), Millan, Daniel, Arroyo, M., Catalan, G., Arias, I.

2015 Physical Review B 92(9), 094101.

Phase-field modeling and simulation of fracture in brittle materials with strongly anisotropic surface energy.

Li, B., Peco, C. (Author), Millan, Daniel, Arias, I., Arroyo, M.

2015 International Journal for Numerical Methods in Engineering 102(3-4), 711-727.

Revisiting pyramid compression to quantify flexoelectricity: A three-dimensional simulation study.

Abdollahi, A., Millan, Daniel, Peco, C. (Author), Arroyo, M., Arias, I.

2015 Physical Review B 91(10), 104103.

Computational evaluation of the flexoelectric effect in dielectric solids.

Abdollahi, A., Peco, C. (Author), Millan, D., Arroyo, M., Arias, I.

2014 Journal of Applied Physics 116(9), 093502.

An adaptive meshfree method for phase- field models of biomembranes. Part I: Approximation with maximum-entropy basis functions.

Rosolen, A., Peco, C. (Primary Author), Arroyo, M.

2013 Journal of Computational Physics 249, 303-319.

An adaptive meshfree method for phase- field models of biomembranes. Part II: A Lagrangian approach for membranes in viscous fluids.

Peco, C. (Primary Author), Rosolen, A., Arroyo, M. (2013).

2013 Journal of Computational Physics 249, 320-336.