



DIMITRIOS SAVVAS

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PROFILE

My general research interest lies in the field of Applied and Computational Mechanics. Particularly, I am interested in modeling and scientific analysis of nanocomposite structures. Computational challenges in simulating such heterogeneous materials at nano-scale requires usage, implementation and development of conventional and extended finite element method (FEM/XFEM) coupled with molecular dynamics (MD) simulation methods. My research activity is focused on multi-scale simulation and homogenization techniques applied on carbon nanotube (CNT) and graphene nanoplatelet (GnP) reinforced composites in order to establish efficient constitutive materials laws capable to predict their mechanical behavior. In addition, my research on advanced nonlinear computational algorithms aims to model complicated phenomena taking place at nano-scale, such as slippage of reinforcements, fracture, dislocation of atoms in lattice structures, shear bands etc. For this purpose my participation in various European research programs (ERC, FP7 etc.) relevant to the aforementioned subjects has equipped me with valuable experience. Moreover, I have published 11 research papers in high impact factor scientific journals, 24 papers in conference proceedings and 2 book chapters.

EDUCATION

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| <p>Postdoctoral studies in Computational Mechanics
 Aristotle University of Thessaloniki
 Department of Civil Engineering
 Institute of Structural Analysis & Dynamics of Structures</p> | <p>2020</p> |
| <p>Postdoctoral studies in Computational Mechanics
 National Technical University of Athens
 School of Civil Engineering
 Institute of Structural Analysis & Antiseismic Research</p> | <p>2015 - 2018</p> |
| <p>Ph.D. in Mechanics
 National Technical University of Athens
 School of Civil Engineering
 <u>Ph.D thesis title:</u> "Multiscale analysis of CNT and GnP-reinforced composites using FEM/XFEM"</p> | <p>2010 - 2015</p> |
| <p>M.Sc. in Applied Mechanics
 National Technical University of Athens
 Inter-Departmental Postgraduate Course
 Leader: School of Applied Mathematical and Physical Sciences
 <u>Master thesis title:</u> "Multiscale analysis of CNT-reinforced composite structures under cyclic loading"</p> | <p>2009 - 2012
 <i>Very Good 9.83/10.0</i></p> |
| <p>M.Sc. in Computational Mechanics
 National Technical University of Athens
 Inter-Departmental Postgraduate Course
 Leader: School of Chemical Engineering</p> | <p>2008 - 2010
 <i>Very Good 9.00/10.0</i></p> |

Direction "Solids"

Master thesis title: "Development of extended finite element code for the simulation of cracked bodies"

M.Sc. in Marine Technology and Science

2007 - 2009

National Technical University of Athens

Very Good 9.12/10.0

Inter-Departmental Postgraduate Course

Leader: School of Naval Architecture and Marine Engineering

Master thesis title: "Implementation of failure criteria into finite element code for ductile materials under multiaxial stress states"

Diploma in Mechanical Engineering

2000 - 2006

Aristotle University of Thessaloniki

Very Good 7.42/10.0

Faculty of Engineering

School of Mechanical Engineering

Department of design and structures

Diploma thesis title: "Optimal design of a modified orthoglide parallel kinematic mechanism used in a CNC milling machine"

Certificate of graduation (High school)

1995 - 1998

Kanalaki Prevezis

Excellent 19.2/20.0

AWARDS-SCHOLARSHIPS

1. Thomaidion award for the best paper published in Scientific Journal. D. Savvas, G. Stefanou, M. Papadrakakis, G. Deodatis, "Homogenization of random heterogeneous media with inclusions of arbitrary shape modeled by XFEM", Computational Mechanics, Volume 54, 2014, 1221-1235.
2. Phd scholarship from National Technical University of Athens (ELKE) (2011-2015)

TECHNICAL SKILLS & OTHERS

Programming Languages and Software: Fortran, Java, Python, C, C++, C#, Matlab, Mathematica, Abaqus, Ansys, Comsol, Nastran, ANSA, μ ETA, AutoCAD, Solidworks, Inventor

Languages: Greek, English (Michigan Proficiency)

Military service: Completed

PUBLICATIONS

Papers in Scientific Journals (Scopus: h-index=8, total citations=271):

1. D. Savvas, I. Papaioannou, G. Stefanou, "Bayesian identification and model comparison for random property fields derived from material microstructure", Computer Methods in Applied Mechanics and Engineering, 365 (2020) 113026.
2. D. Savvas, G. Stefanou, "The Effect of Material and Geometrical Uncertainty on the Homogenized Properties of Graphene Sheet-Reinforced Composites", ASCE-ASME Journal of Risk and Uncertainty in Engineering Systems Part B: Mechanical Engineering, Volume 5(3), 2019.
3. D. Savvas, G. Stefanou, "Determination of random material properties of graphene sheets with different types of defects", Composites Part B: Engineering, Volume 143, p. 47 - 54, 2018.

4. G. Stefanou, D. Savvas, M. Papadrakakis, "Stochastic finite element analysis of composite structures based on mesoscale random fields of material properties", *Computer Methods in Applied Mechanics and Engineering*, Volume 326, p. 319 - 337, 2017.
5. D. Savvas, G. Stefanou, "Assessment of the effect of microstructural uncertainty on the macroscopic properties of random composite materials", *Journal of Composite Materials*, Volume 51 (19), p. 2707 - 2725, 2016.
6. D. Savvas, G. Stefanou, V. Papadopoulos, M. Papadrakakis, "Effect of waviness and orientation of carbon nanotubes on random apparent material properties and RVE size of CNT reinforced composites", *Composite Structures*, Volume 152, p. 870-882, 2016.
7. D. Savvas, G. Stefanou, M. Papadrakakis, "Determination of RVE size for random composites with local volume fraction variation", *Computer Methods in Applied Mechanics and Engineering*, Volume 305, p. 340-358, 2016.
8. G. Stefanou, D. Savvas, M. Papadrakakis, "Stochastic finite element analysis of composite structures based on material microstructure", *Composite Structures*, Volume 132, p. 384-392, 2015.
9. D. Savvas, G. Stefanou, M. Papadrakakis, G. Deodatis, "Homogenization of random heterogeneous media with inclusions of arbitrary shape modeled by XFEM", *Computational Mechanics*, Volume 54, p. 1221-1235, 2014.
10. D. Savvas, V. Papadopoulos, "Nonlinear multiscale homogenization of carbon nanotube reinforced composites with interfacial slippage", *International Journal of Multiscale Computational Engineering*, Volume 12, p. 271-289, 2014.
11. D. Savvas, V. Papadopoulos, M. Papadrakakis, "The effect of interfacial shear strength on damping behavior of carbon nanotube reinforced composites", *International Journal of Solids and Structures*, Volume 49, p. 3823-3837, 2012.

Papers in Conference Proceedings:

1. D. Savvas, G. Stefanou, M. Papadrakakis, "Effective properties of random graphene sheet reinforced composites", *3rd International Conference on Uncertainty Quantification in Computational Sciences and Engineering (UNCECOMP2019)*, Crete, Greece, June 24-26, 2019
2. D. Savvas, G. Stefanou, "Homogenization of Random Graphene Sheet Reinforced Composites", *27th International Conference on Composites/Nano Engineering (ICCE)*, Granada, Spain, July 14-20, 2019.
3. D. Savvas, G. Stefanou, "Homogenization of graphene sheet reinforced composites considering material and geometrical uncertainty", *9th International Conference on Computational Methods (ICCM)*, Rome, Italy, August 6-10, 2018.
4. D. Savvas, G. Stefanou, "An efficient computational procedure for the determination of the stochastic mechanical properties of defective graphene sheets", *13th World Congress in Computational Mechanics (WCCM)*, New York City, United States, July 22-27, 2018.
5. G. Stefanou, D. Savvas, M. Papadrakakis, "Mesoscale random fields for the apparent material properties of random microstructures", *9th International Congress on Computational Mechanics (GRACM)*, Chania, Crete, Greece, June 4-6, 2018.
6. G. Stefanou, D. Savvas, M. Papadrakakis, "Response variability of composite structures with mechanical properties derived from material microstructure", *12th International Conference on Structural Safety & Reliability*, Vienna, Austria, August 6-10, 2017.
7. G. Stefanou, D. Savvas, M. Papadrakakis, "Generation of random material property fields based on microstructure", *2nd International Conference on Uncertainty Quantification in Computational*

- Sciences and Engineering, Rhodes Island, Greece, June 15-17, 2017.
8. D. Savvas, G. Stefanou, "Homogenization of composite materials considering different types of microstructural uncertainty", 2nd International Conference on Uncertainty Quantification in Computational Sciences and Engineering, Rhodes Island, Greece, June 15-17, 2017.
 9. G. Stefanou, D. Savvas, M. Papadrakakis, "Determination of mesoscale random fields and RVE size of spatially random composites", Engineering Mechanics Institute (EMI) International Conference, Metz, France, October 25-27, 2016.
 10. D. Savvas, G. Stefanou, "Homogenization of two-phase composites with random material properties", EUROMECH COLLOQUIUM 584, Multi-uncertainty and multi-scale methods and related applications, Porto, Portugal, September 14-16, 2016.
 11. G. Stefanou, D. Savvas, M. Papadrakakis, "Determination of the apparent properties and RVE size of spatially random composites", EUROMECH COLLOQUIUM 584, Multi-uncertainty and multi-scale methods and related applications, Porto, Portugal, September 14-16, 2016.
 12. D. Savvas, G. Stefanou, V. Papadopoulos, M. Papadrakakis, "Determination of RVE size for random CNT reinforced composites", Proc. of the 7th European Congress on Computational Methods in Applied Science and Engineering (ECCOMAS), Crete, Greece June 5-10, 2016.
 13. D. Savvas, G. Stefanou, "Determination of mesoscale random fields for the apparent properties of spatially random composites", Proc. of the 7th European Congress on Computational Methods in Applied Science and Engineering (ECCOMAS), Crete, Greece June 5-10, 2016.
 14. G. Stefanou, D. Savvas, "An efficient approach for the determination of the apparent properties and RVE size of spatially random composites", Proc. of the 11th HSTAM International Congress on Mechanics, Athens, Greece, May 27-30, 2016.
 15. G. Stefanou, D. Savvas, "Stochastic finite elements based on material microstructure", Proc. of the 13th International Probabilistic Workshop (IPW2015), Liverpool, UK, 4-6 November 2015.
 16. G. Stefanou, D. Savvas, M. Papadrakakis, "The role of microstructure uncertainty in stochastic finite element analysis", Proc. of the 8th International Congress on Computational Mechanics (GRACM), Volos, Greece, 12-15 July 2015.
 17. G. Stefanou, D. Savvas, M. Papadrakakis, "Effective properties of random microstructures as a basis for stochastic finite element analysis", Proc. of the 1st International Conference on Uncertainty Quantification in Computational Sciences and Engineering (UNCECOMP 2015), Crete, Greece, 25-27 May 2015.
 18. G. Stefanou, D. Savvas, M. Papadrakakis, "The influence of inclusion shape on the effective properties of random nanocomposites", Proc. of the International Conference on Advances in Composite Materials and Structures (CACMS 2015), Istanbul, Turkey, April 13-15, 2015.
 19. G. Stefanou, D. Savvas, M. Papadrakakis, G. Deodatis, "Effective properties of two-phase random media modeled by XFEM", Proc. of the 11th World Congress on Computational Mechanics (WCCM), Barcelona, Spain, July 20-25, 2014.
 20. G. Stefanou, D. Savvas, M. Papadrakakis, G. Deodatis, "Homogenization of random heterogeneous media with inclusions of arbitrary shape", Proc. of the IUTAM Symposium on "Multiscale modeling and uncertainty quantification of materials and structures", Santorini, Greece, September 9-11, 2013.
 21. V. Papadopoulos, D. Savvas, "Multiscale modeling of damping in carbon nanotube reinforced composites", Proc. of the 10th HSTAM International Congress on Mechanics, Chania, Crete Island, Greece, May 25-27, 2013.

22. D. Savvas, V. Papadopoulos, "Characterization of carbon nanotube reinforced thermoplastics using hierarchical multiscale simulation", Proc. of the 10th HSTAM International Congress on Mechanics, Chania, Crete Island, Greece, May 25-27, 2013.
23. D. Savvas, V. Papadopoulos, M. Papadrakakis, O. Kokkinos, "Stochastic characterization of the waviness of carbon nanotubes and its effect on the mechanical properties of nanocomposites", Proc. of the 10th World Congress on Computational Mechanics (WCCM), Sao Paulo, Brazil, July 8-13, 2012.
24. D. Savvas, V. Papadopoulos, M. Papadrakakis, "The effect of random waviness of carbon nanotubes on the mechanical and damping properties of nanocomposites", Proc. of the 6th European Congress on Computational Methods in Applied Science and Engineering (ECCOMAS), Vienna, Austria, September 10-14, 2012.

Book Chapters:

1. G. Stefanou, D. Savvas, M. Papadrakakis, G. Deodatis. Homogenization of random heterogeneous media with inclusions of arbitrary shape, "Multiscale Modeling and Uncertainty Quantification of Materials and Structures", pp. 85-99, Springer (2014).
2. D. Savvas, V. Papadopoulos, M. Papadrakakis. Mechanical performance of carbon nanotube reinforced composites under cyclic loading, "A book dedicated to Bernhard A. Schrefler", Bytes and Science (2012).

SCIENTIFIC LECTURES

1. Scientific lecture about "Mesoscale random fields for the apparent material properties of random microstructures", Invited speaker: "Key International Talent Program of Chinese Universities", School of Civil Engineering, Tongji University, Shanghai, China, May 2018.

ORGANIZATION OF MINI-SYMPOSIUMS IN INTERNATIONAL CONFERENCES

1. "Multiscale analysis and design of random heterogeneous media", 3rd International Conference on Uncertainty Quantification in Computational Sciences and Engineering, Crete Island, Greece, June 24-26, 2019 (with G. Stefanou, V. Papadopoulos, 4 participants).
2. "Multiscale analysis and design of random heterogeneous media", 2nd International Conference on Uncertainty Quantification in Computational Sciences and Engineering, Rhodes Island, Greece, June 15-17, 2017 (with G. Stefanou, V. Papadopoulos, 10 participants).

REVIEWER IN SCIENTIFIC JOURNALS

1. Computer Methods in Applied Mechanics and Engineering (Elsevier)
2. Composite Structures (Elsevier)
3. Composites Science and Technology (Elsevier)
4. International Journal of Solids and Structures (Elsevier)
5. Meccanica (Springer)
6. Applied Physics A (Springer)
7. Journal of Composite Materials (Sage)
8. Journal of Reinforced Plastics and Composites (Sage)

9. Polymer International (Wiley)
10. Computational Methods in Structural Engineering (Frontiers in Built Environment)
11. Journal of Risk and Uncertainty in Engineering Systems Part B: Mechanical Engineering (ASCE-ASME)

REVIEWER IN INTERNATIONAL CONFERENCES

1. 7th International Conference on Computational Methods in Structural Dynamics and Earthquake Engineering (COMPDYN 2019), Crete, Greece , June 24-26, 2019
2. 3rd International Conference on Uncertainty Quantification in Computational Sciences and Engineering (UNCECOMP 2019), Crete, Greece , June 24-26, 2019
3. 6th International Conference on Computational Methods in Structural Dynamics and Earthquake Engineering (COMPDYN 2017), Rhodes Island, Greece, June 15-17, 2017.
4. 2nd International Conference on Uncertainty Quantification in Computational Sciences and Engineering (UNCECOMP 2017), Rhodes Island, Greece, June 15-17, 2017.
5. 7th European Congress on Computational Methods in Applied Science and Engineering (ECCOMAS), Crete, Greece June 5-10, 2016.
6. 5th International Conference on Computational Methods in Structural Dynamics and Earthquake Engineering (COMPDYN 2015), Crete, Greece, 25-27 May 2015.
7. 1st International Conference on Uncertainty Quantification in Computational Sciences and Engineering (UNCECOMP 2015), Crete, Greece, 25-27 May 2015.
8. IUTAM Symposium on "Multiscale modeling and uncertainty quantification of materials and structures", Santorini, Greece, September 9-11, 2013
9. 4th International Conference on Computational Methods in Structural Dynamics and Earthquake Engineering (COMPDYN 2013), Kos Island Greece, 12-14 June, 2013.
10. IV International Conference on Coupled Problems in Science and Engineering (COUPLED PROBLEMS 2011), Kos Island Greece, 20-22 June, 2011.
11. 3rd International Conference on Computational Methods in Structural Dynamics and Earthquake Engineering (COMPDYN 2011), Corfu, Greece, 25-28 May, 2011.

EMPLOYMENT

Self-Employed - Dimitrios Savvas' Office

Athens, Greece, 2009 - now

- Electro-mechanical and Simulation projects
- Research in Engineering Problems
- Research in nanocomposites (nano-materials)

Participation in Research Projects

2010 - now

- "Stochastic multiscale modeling of concrete structures reinforced with graphene nanoparticles - Investigation of the effect of nano-inclusions on the mechanical properties of concrete", co-financed by European Social Fund (ESF) and the Greek State (2020-2021).

- "Mastering the computational challenges in numerical modeling and optimum design of CNT reinforced composites", (MASTER-63/1912), European Research Council Advanced Grant (2012-2018).
- "Linking micromechanics-based properties with the stochastic finite element method: a challenge for multiscale modeling of heterogeneous materials and structures", (MICROLINK-68/1336), Supporting Postdoctoral Researchers of the Operational Program Education and Lifelong Learning (Action's Beneficiary: General Secretariat for Research and Technology), (2012-2014).
- "Multiscale reinforcement of semi-crystalline thermoplastics sheets and honeycombs", (MRECT-63/1805), European Community FP7 Collaborative Project (2010-2013).

TEACHING EXPERIENCE

- Lecturer in University of Thessaly (UTH), Department of Civil Engineering,
Course: Structural Analysis III 2019-2020
- Lecturer in University of Thessaly (UTH), Department of Civil Engineering,
Course: Strength of Materials I 2019-2020
- Lecturer in University of Thessaly (UTH), Department of Civil Engineering,
Course: Strength of Materials II 2019-2020
- Lecturer in University of West Attica (UNIWA), School of Engineering, Department of Naval Architecture,
Course: Mechanics I - Statics 2019-2020
- Lecturer in University of West Attica (UNIWA), School of Engineering, Department of Naval Architecture,
Course: Mechanics II - Strength of Materials 2019-2020
- Teaching Assistant in School of Pedagogical and Technological Education (ASPANTE), Department of Civil Engineering Educators,
Course: Computational Structural Engineering 2019-2020
- Teaching Assistant in School of Pedagogical and Technological Education (ASPANTE), Department of Civil Engineering Educators,
Course: Computational Structural Engineering 2018-2019
- Teaching Assistant in School of Pedagogical and Technological Education (ASPANTE), Department of Civil Engineering Educators,
Course: Computational Structural Engineering 2017-2018
- Lecturer in School of Pedagogical and Technological Education (ASPANTE), Department of Civil Engineering Educators,
Course: Strength of Materials II 2017-2018
- Teaching Assistant in Technological Educational Institute of Athens (TEI), Department of Civil Engineering,

Course: Programming Languages

2010-2011

- Teaching Assistant in Technological Educational Institute of Athens (TEI), Department of Civil Engineering,
Course: Strength of Materials

2010-2011

MEMBERSHIPS

- Member of the Technical Chamber of Greece 2009 - now
- Member of the Greek Association of Computational Mechanics 2016 - now