

# DIMITRIOS SAVVAS

Assistant Professor  
Department of Mechanical Engineering  
University of West Attica

Address: 250, Thivon and P. Ralli avenue, 12244, Egaleo, Greece  
Tel: -  
E-mail: dsavvas@uniwa.gr

## RESEARCH INTEREST

---

Computational Mechanics of Composite Materials with applications in mechanical engineering. Determination of mechanical behavior of composite structures under static and dynamic loads, simulation of stochastic phenomena taking place at various spatial scales (nano, micro, meso, macro scale), structural analysis and strength of materials using advanced computational techniques. Polymer composites reinforced with carbon nanotubes, graphene nanoplatelets and particles of various materials. Determination of the effect of spatial phenomena at the microstructure on the mechanical behavior of composite structures. Implementation and development of conventional and extended finite element method (FEM/XFEM) coupled with molecular dynamics (MD) simulation methods in order to simulate complicated phenomena taking place at nano-scale, such as slippage of reinforcements, fracture, dislocation of atoms, shear bands. Multi-scale simulation and homogenization techniques, surrogate modeling. Topology optimization for design and manufacturing of composite structures.

## EDUCATION - ACADEMIC POSITIONS

---

**Assistant Professor** 2023  
Department of Mechanical Engineering  
School of Engineering  
University of West Attica

**Researcher** 2021 - 2023  
National Technical University of Athens  
School of Civil Engineering  
Institute of Structural Analysis & Antiseismic Research

**Researcher** 2021 - 2023  
Aristotle University of Thessaloniki  
School of Civil Engineering  
Laboratory of Structural Analysis & Dynamic of Structures

**Postdoctoral studies in Computational Mechanics** 2020 - 2021  
Aristotle University of Thessaloniki  
School of Civil Engineering  
Laboratory of Structural Analysis & Dynamic of Structures

**Postdoctoral studies in Computational Mechanics** 2015 - 2018  
National Technical University of Athens  
School of Civil Engineering  
Institute of Structural Analysis & Antiseismic Research

**Ph.D. in Mechanics** 2010 - 2015  
National Technical University of Athens  
School of Civil Engineering  
Ph.D thesis title: "Multiscale analysis of CNT and GnP-reinforced composites using FEM/XFEM"

**M.Sc. in Applied Mechanics** 2009 - 2012  
National Technical University of Athens *Very Good 9.83/10.0*  
Inter-Departmental Postgraduate Course  
Leader: School of Applied Mathematical and Physical Sciences  
Master thesis title: "Multiscale analysis of CNT-reinforced composite structures under cyclic loading"

**M.Sc. in Computational Mechanics** 2008 - 2010  
National Technical University of Athens *Very Good 9.00/10.0*  
Inter-Departmental Postgraduate Course  
Leader: School of Chemical Engineering  
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"

## AWARDS-SCHOLARSHIPS

---

1. PostDoc Scholarship from European Social Fund and the Greek State for the research project entitled "Stochastic multiscale modeling of concrete structures reinforced with graphene nanoparticles", (2020-2021)
2. Phd scholarship from Research Committee of National Technical University of Athens, (2010-2014)
3. 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.

## TECHNICAL SKILLS & OTHERS

---

**Languages:** Greek, English (Michigan Proficiency)

**Programming Languages and Software:** Fortran, Java, Python, C, C++, C#, Matlab, Mathematica, Abaqus, Ansys, AutoCAD, Solidworks, Inventor

## PUBLICATIONS

---

### Papers in Scientific Journals (Scopus: h-index=10, total citations=477):

1. P. Gavallas, G. Stefanou, D. Savvas, C. Mattrand, J. M. Bourinet, "CNN-based prediction of microstructure-derived random property fields of composite materials", *Computer Methods in Applied Mechanics and Engineering*, 430 (2024) 117207.
2. P. Gavallas, D. Savvas, G. Stefanou, "Mechanical properties of graphene nanoplatelets containing random structural defects", *Mechanics of Materials*, 180, (2023) 104611.
3. G. Stefanou, D. Savvas, P. Gavallas, I. Papaioannou, "The effect of random field parameter uncertainty on the response variability of composite structures", *Composites Part C: Open Access*, (2022) 100324.
4. G. Stefanou, D. Savvas, P. Metsis, "Random Material Property Fields of 3D Concrete Microstructures Based on CT Image Reconstruction", *Materials*, 14.6 (2021) 1423.
5. 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.
6. 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.
7. 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.
8. 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.
9. 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.
10. 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.
11. 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.
12. 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.
13. 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.

14. 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.
15. 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. G. Stefanou, D. Savvas, P. Gavalas, I. Papaioannou, "Response statistics of composite structures with stochastic material properties based on microstructure", *30<sup>th</sup> International Conference on Noise and Vibration Engineering (ISMA2022) - 9<sup>th</sup> Uncertainty in Structural Dynamics (USD2022)*, Leuven, Belgium, September 12-14, 2022.
2. P. Gavalas, D. Savvas, G. Stefanou, "A Multiscale Computational Framework for the Simulation of Graphene Nanoplatelets", *15<sup>th</sup> World Congress on Computational Mechanics & 8<sup>th</sup> Asian Pacific Congress on Computational Mechanics (WCCM-APCOM 2022)*, Yokohama, Japan, July 31 - August 5, 2022.
3. G. Stefanou, D. Savvas, I. Papaioannou, P. Gavalas, "Response variability of composite structures with random spatially varying material properties", *8<sup>th</sup> European Congress on Computational Methods in Applied Sciences and Engineering (ECCOMAS Congress 2022)*, Oslo, Norway, June 5-9, 2022.
4. D. Savvas, G. Stefanou, P. Metsis, "Determination of random apparent material properties of concrete based on CT image reconstruction", *4<sup>th</sup> International Conference on Uncertainty Quantification in Computational Sciences and Engineering (UNCECOMP2021)*, Athens, Greece, June 28-30, 2021.
5. G. Stefanou, D. Savvas, I. Papaioannou, "Parameter identification of the random apparent material properties of two-phase composites in a Bayesian framework", *4<sup>th</sup> International Conference on Uncertainty Quantification in Computational Sciences and Engineering (UNCECOMP2021)*, Athens, Greece, June 28-30, 2021.
6. D. Savvas, I. Papaioannou, G. Stefanou, "Bayesian identification of mesoscale random fields based on material microstructure", *14<sup>th</sup> World Congress in Computational Mechanics (WCCM), ECCOMAS Congress*, Paris, France, July 19-24, 2020.
7. D. Savvas, G. Stefanou, M. Papadrakakis, "Effective properties of random graphene sheet reinforced composites", *3<sup>rd</sup> International Conference on Uncertainty Quantification in Computational Sciences and Engineering (UNCECOMP2019)*, Crete, Greece, June 24-26, 2019.
8. D. Savvas, G. Stefanou, "Homogenization of Random Graphene Sheet Reinforced Composites", *27<sup>th</sup> International Conference on Composites/Nano Engineering (ICCE)*, Granada, Spain, July 14-20, 2019.
9. D. Savvas, G. Stefanou, "Homogenization of graphene sheet reinforced composites considering material and geometrical uncertainty", *9<sup>th</sup> International Conference on Computational Methods (ICCM)*, Rome, Italy, August 6-10, 2018.
10. D. Savvas, G. Stefanou, "An efficient computational procedure for the determination of the stochastic mechanical properties of defective graphene sheets", *13<sup>th</sup> World Congress in Computational Mechanics (WCCM)*, New York City, United States, July 22-27, 2018.
11. G. Stefanou, D. Savvas, M. Papadrakakis, "Mesoscale random fields for the apparent material properties of random microstructures", *9<sup>th</sup> International Congress on Computational Mechanics (GRACM)*, Chania, Crete, Greece, June 4-6, 2018.

12. G. Stefanou, D. Savvas, M. Papadrakakis, "Response variability of composite structures with mechanical properties derived from material microstructure", 12<sup>th</sup> International Conference on Structural Safety & Reliability, Vienna, Austria, August 6-10, 2017.
13. G. Stefanou, D. Savvas, M. Papadrakakis, "Generation of random material property fields based on microstructure", 2<sup>nd</sup> International Conference on Uncertainty Quantification in Computational Sciences and Engineering, Rhodes Island, Greece, June 15-17, 2017.
14. D. Savvas, G. Stefanou, "Homogenization of composite materials considering different types of microstructural uncertainty", 2<sup>nd</sup> International Conference on Uncertainty Quantification in Computational Sciences and Engineering, Rhodes Island, Greece, June 15-17, 2017.
15. 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.
16. 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.
17. 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.
18. D. Savvas, G. Stefanou, V. Papadopoulos, M. Papadrakakis, "Determination of RVE size for random CNT reinforced composites", Proc. of the 7<sup>th</sup> European Congress on Computational Methods in Applied Science and Engineering (ECCOMAS), Crete, Greece June 5-10, 2016.
19. D. Savvas, G. Stefanou, "Determination of mesoscale random fields for the apparent properties of spatially random composites", Proc. of the 7<sup>th</sup> European Congress on Computational Methods in Applied Science and Engineering (ECCOMAS), Crete, Greece June 5-10, 2016.
20. G. Stefanou, D. Savvas, "An efficient approach for the determination of the apparent properties and RVE size of spatially random composites", Proc. of the 11<sup>th</sup> HSTAM International Congress on Mechanics, Athens, Greece, May 27-30, 2016.
21. G. Stefanou, D. Savvas, "Stochastic finite elements based on material microstructure", Proc. of the 13<sup>th</sup> International Probabilistic Workshop (IPW2015), Liverpool, UK, 4-6 November 2015.
22. G. Stefanou, D. Savvas, M. Papadrakakis, "The role of microstructure uncertainty in stochastic finite element analysis", Proc. of the 8<sup>th</sup> International Congress on Computational Mechanics (GRACM), Volos, Greece, 12-15 July 2015.
23. G. Stefanou, D. Savvas, M. Papadrakakis, "Effective properties of random microstructures as a basis for stochastic finite element analysis", Proc. of the 1<sup>st</sup> International Conference on Uncertainty Quantification in Computational Sciences and Engineering (UNCECOMP 2015), Crete, Greece, 25-27 May 2015.
24. 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.
25. G. Stefanou, D. Savvas, M. Papadrakakis, G. Deodatis, "Effective properties of two-phase random media modeled by XFEM", Proc. of the 11<sup>th</sup> World Congress on Computational Mechanics (WCCM), Barcelona, Spain, July 20-25, 2014.
26. 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 mod-

eling and uncertainty quantification of materials and structures”, Santorini, Greece, September 9-11, 2013.

27. V. Papadopoulos, D. Savvas, ”Multiscale modeling of damping in carbon nanotube reinforced composites”, Proc. of the 10<sup>th</sup> HSTAM International Congress on Mechanics, Chania, Crete Island, Greece, May 25-27, 2013.
28. D. Savvas, V. Papadopoulos, ”Characterization of carbon nanotube reinforced thermoplastics using hierarchical multiscale simulation”, Proc. of the 10<sup>th</sup> HSTAM International Congress on Mechanics, Chania, Crete Island, Greece, May 25-27, 2013.
29. 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 10<sup>th</sup> World Congress on Computational Mechanics (WCCM), Sao Paulo, Brazil, July 8-13, 2012.
30. 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 6<sup>th</sup> 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”, 4<sup>th</sup> International Conference on Uncertainty Quantification in Computational Sciences and Engineering, Athens, Greece, June 28-30, 2021 with G. Stefanou, M. Pingaro, P. Trovalusci, 9 participants).
2. ”Multiscale analysis and design of random heterogeneous media”, 3<sup>rd</sup> International Conference on Uncertainty Quantification in Computational Sciences and Engineering, Crete Island, Greece, June 24-26, 2019 (with G. Stefanou, V. Papadopoulos, 4 participants).
3. ”Multiscale analysis and design of random heterogeneous media”, 2<sup>nd</sup> 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. 7<sup>th</sup> International Conference on Computational Methods in Structural Dynamics and Earthquake Engineering (COMPDYN 2019), Crete, Greece , June 24-26, 2019
2. 3<sup>rd</sup> International Conference on Uncertainty Quantification in Computational Sciences and Engineering (UNCECOMP 2019), Crete, Greece , June 24-26, 2019
3. 6<sup>th</sup> International Conference on Computational Methods in Structural Dynamics and Earthquake Engineering (COMPDYN 2017), Rhodes Island, Greece, June 15-17, 2017.
4. 2<sup>nd</sup> International Conference on Uncertainty Quantification in Computational Sciences and Engineering (UNCECOMP 2017), Rhodes Island, Greece, June 15-17, 2017.
5. 7<sup>th</sup> European Congress on Computational Methods in Applied Science and Engineering (ECCOMAS), Crete, Greece June 5-10, 2016.
6. 5<sup>th</sup> International Conference on Computational Methods in Structural Dynamics and Earthquake Engineering (COMPDYN 2015), Crete, Greece, 25-27 May 2015.
7. 1<sup>st</sup> 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. 4<sup>th</sup> 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. 3<sup>rd</sup> International Conference on Computational Methods in Structural Dynamics and Earthquake Engineering (COMPDYN 2011), Corfu, Greece, 25-28 May, 2011.

## TEACHING EXPERIENCE

---

- Lecturer in University of West Attica (UNIWA), School of Engineering, Department of Mechanical Engineering,  
Courses: Mechanics I - Statics, Mechanics II - Strength of Materials 2020-2023

- Lecturer in University of West Attica (UNIWA), School of Engineering, Department of Naval Architecture,  
Courses: Mechanics I - Statics, Mechanics II - Strength of Materials 2019-2021
- Lecturer in University of West Attica (UNIWA), School of Engineering, Department of Industrial Design and Production Engineering,  
Courses: Mechanics I - Statics, Mechanics II - Strength of Materials 2020-2021
- 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
- Teaching Assistant in School of Pedagogical and Technological Education (ASPATE), Department of Civil Engineering Educators,  
Course: Computational Structural Engineering 2018-2019
- Lecturer in School of Pedagogical and Technological Education (ASPATE), Department of Civil Engineering Educators,  
Course: Strength of Materials II 2017-2018
- Teaching Assistant in School of Pedagogical and Technological Education (ASPATE), Department of Civil Engineering Educators,  
Course: Computational Structural Engineering 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

## EMPLOYMENT

---

**Mechanical Engineer in water supply and sewerage industry of Athens (EYDAP A.E )** 2020 - 2023

**Self-Employed - Dimitrios Savvas' Office** Athens, Greece, 2010 - 2022

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

**Participation in Research Projects** 2010 - now



- "European Training Network on Grey-Box Models for Safe and Reliable Intelligent Mobility Systems", Marie Skłodowska-Curie Innovative Training Networks, Horizon 2020, (2021 - now).
- "DComeX - Data Driven Computational Mechanics at exascale", European High Performance Computing Joint Undertaking - EuroHPC JU, (2021-2023).
- "Stochastic multiscale modeling of concrete structures reinforced with graphene nanoparticles - Investigation of the effect of nano-inclusions on the mechanical properties of concrete", (EDBM 103), European Social Fund and the Greek State (2020 - 2021).
- "Mastering the computational challenges in numerical modeling and optimum design of CNT reinforced composites", (MASTER-63/191200), European Research Council Advanced Grant (2012 - 2018).
- "Multiscale reinforcement of semi-crystalline thermoplastics sheets and honeycombs", (MRECT-63/180500), European Community FP7 Collaborative Project (2010-2013).
- "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).

## MEMBERSHIPS

---

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