

# THEODOSIOS THEODOSIOU

Associate Professor · Department of Energy Systems

University of Thessaly, School of Technology

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## CONTACT INFORMATION

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## CURRENT POSITION

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**Associate Professor at the Department of Energy Systems, University of Thessaly**

Specialty: Computational Methods for the Analysis and Design of Materials, Structures and Constructions

Department Chair (term: 1 Sep 2025 – 31 Aug 2028)

Member of the Faculty Senate of the University of Thessaly

Member of the School of Technology Faculty Assembly

## RESEARCH INTERESTS

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- Development of multiscale & multiresolution numerical and analytical models for materials, structures and constructions
- Application of artificial intelligence (machine learning, deep learning, fuzzy cognitive maps) and advanced computational techniques in energy and manufacturing systems
- Structural health monitoring · wave propagation in composite structures · piezoelectric sensors
- Finite element methods · molecular mechanics · nanomechanics of carbon nanotubes and graphene

## EDUCATION

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<b>2010</b>	Ph.D. · Mechanical & Aeronautical Engineering University of Patras · Thesis: Atomistic Models for the Electromechanical Behaviour of Carbon Nanotubes and Polymer Nanocomposites · Advisor: Prof. Dimitrios Saravanos
<b>2016</b>	M.Sc. · Information Systems Hellenic Open University · Thesis: Wavelet Functions for Privacy-Preserving Record Linkage · Advisor: Prof. Vasileios Verykios
<b>2004</b>	Diploma (5-year) · Mechanical & Aeronautical Engineering · University of Patras · Thesis: Experimental study and theoretical prediction of thermal-fatigue degradation of composites · Advisor: Prof. Georgios Papanicolaou

## ACADEMIC POSITIONS

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<b>Oct 2023 – present</b>	Associate Professor. Dept. of Energy Systems, University of Thessaly Specialty: Computational Methods for the Analysis and Design of Materials,
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## Structures and Constructions

<b>Aug 2022 – Oct 2023</b>	Tenured Assistant Professor. Dept. of Energy Systems, University of Thessaly
<b>Dec 2019 – Aug 2022</b>	Assistant Professor (term). Dept. of Energy Systems, University of Thessaly
<b>May 2019 – Dec 2019</b>	Assistant Professor (term). General Department, University of Thessaly (Larissa)
<b>2010 – 2019</b>	Postdoctoral Researcher. Dept. of Mechanical & Aeronautical Eng., University of Patras
<b>2004 – 2010</b>	Research Engineer · Ph.D. Candidate. Dept. of Mechanical & Aeronautical Eng., University of Patras

## TEACHING (UNIVERSITY OF THESSALY)

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Current courses (Dept. of Energy Systems):

- Technical Drawing (1st semester)
- Automatic Control Systems (4th semester)
- Numerical Analysis of Structures and Energy Systems (5th semester)
- Advanced Topics in Sensor Technology (8th semester)

Previously taught (Mechanical Engineering Programme, former TEI Thessaly):

- Metal Structures · Finite Elements in Structures · Structural Design · Mechanical Drawing

Teaching at University of Patras (2004–2017):

- Introduction to Computers · Computer Programming · Finite Element Methods (auxiliary / PD 407/80 basis)

## RESEARCH PROJECTS (Selected)

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### At the University of Thessaly (2019–present)

<b>OPTIMAI (H2020)</b>	Optimizing Manufacturing Processes through AI and Virtualization · Deputy Principal Investigator (2021–2024)
<b>EMERALD (ELIDEK)</b>	Fuzzy Cognitive Explainable Analytics for Nuclear Medical Diagnosis · Deputy PI (2021–2024)
<b>SPARK-AI (EU)</b>	Skills and Practices for AI-Driven Research Knowledge · Deputy PI (2025–2028)

### At the University of Patras (2004–2019) – Selected Projects

<b>K. Karatheodori</b>	Nanomechanics of CNT and nanocomposites · Univ. of Patras Research Committee (2004–2006)
<b>NOESIS (FP6)</b>	Aerospace CNT hybrid composite structures · FP6 STREP #516150 (2007–2009)
<b>WISMOS (FP7)</b>	Wireless strain monitoring system · CleanSky JTI #271874 (2012)
<b>FOUNDATION (FP7)</b>	Smart factory of the future · FP7 Collaborative #360137 (2012–2013)
<b>ΓΡΑΦΕΝΙΟ / THALES</b>	Multiscale models for graphene · ITE/IEXMH (2012–2013)
<b>Taylor Graphene (ERC)</b>	FE simulation of graphene · ERC AdG GA:321124 (2014)
<b>OPENAIR (FP7)</b>	Aircraft noise reduction · FP7 #234313 (2009, 2014)

<b>FIMAC (CleanSky)</b>	Impact analysis on composite leading-edge structures · CleanSky #632420 (2015–2016)
<b>Wireless-FLEX_Sense</b>	Flexible sensor cooperation for SHM · CleanSky #632506 (2015–2016)
<b>InnWind.EU</b>	Innovative 10–20 MW offshore wind systems · FP7 (2016–2017)
<b>TAVAC (H2020)</b>	Active vibration & acoustic comfort · CleanSky 2 #717089 (2017–2018)
<b>BLADEOUT (H2020)</b>	CROR blade-out impact simulations · CleanSky 2 #686813 (2018–2019)
<b>INTELLICONT (H2020)</b>	Intelligent composite aircraft container · CleanSky 2 #785472 (2018–2019)
<b>TRANVIC / EvAuΣuΣ</b>	Active vibration control in transport / Energy-autonomous sensor system (2018–2019)

## SUPERVISION

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Advisory Committee Member (7 Ph.D. students, 2020–present):

- D. Dimitriou – Wavelet FEM for transient dynamics (Univ. of Patras) · Completed with distinction (Dec 2024)
- A. Rapti – Fuzzy cognitive networks and deep learning for XAI (UTh) · Ongoing
- T. Tziolas – Fuzzy cognitive maps and deep learning for data analysis (UTh) · Ongoing
- I. Oikonomou – Innovative wavelet FEM for dynamic models (Univ. of Patras) · Ongoing
- D. Kotzaitis – Optimizing interpretable AI in digital twins (UTh) · Ongoing
- A. Valiakos – Federated Learning for heterogeneous systems (UTh) · Ongoing
- V. KoloRizos – Cloud computing for intelligent decision support (UTh) · Discontinued

Examiner in Doctoral Defence Committees: 3 examinations (Univ. of Ioannina, Univ. of Patras, UTh · 2024–2026)

Undergraduate Thesis Supervisor (selected):

- Digital twin of motorcycle suspension · D. Savvidis (2021)
- AI in augmented reality systems · P. Betsio, A. Orfanoti (2021)
- LPG use in industrial spaces · A. Stefani (2022)
- Energy harvesting from walking · V. Oureili (2024)
- Modelica models for control systems design · K. Lentzos (2024)

## ADMINISTRATIVE RESPONSIBILITIES

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<b>2025–2028</b>	Department Chair, Dept. of Energy Systems, University of Thessaly (elected from a slate of 6 candidates in open procedure)
<b>2025–present</b>	Member of the Faculty Senate, University of Thessaly
<b>2025–present</b>	Member of the School of Technology Faculty Assembly (Dean's Council)
<b>2023–present</b>	Member, Technical Council of the University of Thessaly (alternate)
<b>2021–2024</b>	Academic Affairs Rapporteur, Mechanical Engineering Programme (former TEI Thessaly)
<b>2024–present</b>	Academic Affairs Rapporteur (to the Vice-Rector) for the same programme

Participated in more than 60 evaluation, curriculum reform and procurement committees since 2019.

Laboratory memberships:

- Member, Laboratory of Water Resources Management, Energy & Fluid Mechanics (UTh)
- Collaborating Member, AI, Computational Systems & Technology Applications Laboratory (UTh)

## SELECTED PUBLICATIONS

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### Peer-Reviewed Journal Articles (chronological, 17 articles)

- Theodosiou T.C., Saravanos D.A. Molecular Mechanics Based Finite Element for Carbon Nanotube Modeling. *CMES*, 19 (2007) 121–134.
- Theodosiou T.C., Saravanos D.A. Numerical Modeling of Single-wall CNT Electromechanical Coupling Effects. *J. Intelligent Material Systems & Structures*, 20 (2009) 1649–1661.
- Theodosiou T.C., Saravanos D.A. Numerical investigation of piezoresistive properties of CNT-doped polymers. *Composites Science & Technology*, 70 (2010) 1312–1320.
- Theodosiou T.C., Saravanos D.A. Numerical Simulations Using MM-based FEM on Boron-Nitride Nanotubes. *Int. J. Comput. Methods Eng. Sci. Mech.*, 12 (2011) 203–211.
- Theodosiou T.C., Saravanos D.A. Molecular mechanics simulations of graphene using FE. *Eur. J. Comput. Mech.*, 22 (2013) 59–78.
- Theodosiou T.C., Saravanos D.A. Numerical simulation of graphene fracture using nonlinear FE. *Comput. Materials Science*, 82 (2014) 56–65.
- Nastos C.V., Theodosiou T.C., Rekatsinas C.S., Saravanos D.A. Finite Wavelet Domain Method for Transient Analysis in Rods and Beams. *CMES*, 107 (2015) 379–409.
- Rekatsinas C.S., Nastos C.V., Theodosiou T.C., Saravanos D.A. Time-domain high-order spectral FE for guided waves in laminates. *Wave Motion*, 53 (2015) 1–19.
- Theodosiou T.C., Galiotis C., Saravanos D.A. Phenomenological multiscale FE for single-layer graphene. *Comput. Materials Science*, 115 (2016) 125–136.
- Nastos C.V., Theodosiou T.C., et al. 2D Daubechies finite wavelet domain method for laminated plates. *Comput. Mech.*, 62 (2018) 1187–1198.
- Theodosiou T.C., Rekatsinas C.S., Nastos C.V., Saravanos D.A. Wave-based impact localization in composite plates. *Structural Health Monitoring*, 18 (2019) 2040–2055.
- Theodosiou T.C. Derivative-orthogonal non-uniform B-Spline wavelets. *Mathematics & Computers in Simulation*, 188 (2021) 368–388.
- Papageorgiou K., Theodosiou T., et al. Systematic Review on ML Methods for Root Cause Analysis. *Frontiers in Manufacturing Technology*, 2 (2022).
- Rekatsinas C.S., Siorikis D.K., Nastos C.V., Theodosiou T.C., et al. Efficient Framework for Hailstone Impacts on Composite Plates. *Int. J. Impact Engineering*, 178 (2023) 104628.
- Tziolas T., Papageorgiou K., Theodosiou T., et al. Deep Learning for Defect Detection in Antenna Assembly. *J. Electrical Systems*, 20-10s (2024) 1940–1950.
- Rekatsinas C.S., Theodosiou T.C., et al. Micromechanics-based Framework for Ballistic Impact on Composites. *J. Composite Materials*, 58(27) (2024) 2897–2914.
- Tziolas T., Papageorgiou K., Theodosiou T., et al. Explainable AI for Defect Identification in PCBs. *Applied Sciences*, 15(16) (2025) 9061.
- Theodosiou T., Rekatsinas C. Physics-Informed Neural Networks without Loss Balancing. *F1000Research*, 14:1252 (2026). doi:10.12688/f1000research.169129.2

### Book

- Theodosiou Th. Design of Mechanisms and Structures with FreeCAD. Klidarithmos Publications, 2021. ISBN: 978-960-645-173-7. (Approved academic textbook, Eudoxus #102070448).
- 2nd edition in preparation for 2026–2027.

### Book Chapter

- Theodosiou T.C., Saravanos D.A. Mechanical and Electrical Response Models of Carbon Nanotubes. In: *Carbon Nanotube Enhanced Aerospace Composite Materials*, Springer, 2013, pp. 219–266.

## Conference Papers – Selected (25+ papers)

- CANEUS2006, AIAA 2008, SPIE 2009, EWSHM 2014, SHM 2015, Greener Aviation 2016, EWSHM 2016, PCI 2017, SMART 2017, ECCM 2018, EWSHM 2018, COMPDYN 2019, IISA 2021, ITISE 2022, IISA 2022, ISM 2022, SMART2023 (×3), MLDM 2023, EUSFLAT 2023, ISM 2023, IISA 2026 (accepted)

## Other

- Co-Editor: Special Issue of SMART2023 (ECCOMAS), ECCOMAS Proceedia.
- Co-Editor: Special Issue in Frontiers in Manufacturing Technology (ongoing).
- Reviewer: Computational Materials Science · Aerospace Science and Technology · Composite Interfaces · Int. J. Smart and Nano Materials · Electronic Markets · and others.

## PROFESSIONAL LICENCE & MEMBERSHIPS

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- Licensed Mechanical & Aeronautical Engineer, Technical Chamber of Greece (TEE), since 2004
- Registered for execution of electrical installations, Achaia Regional Authority, since 2007

## OTHER ACTIVITIES

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### Outreach / Public Engagement:

- Speaker at career guidance seminars (KESYP Attica, Larissa, Thessaloniki, 2021)
- Organiser – Mini-Symposium on Smart Manufacturing Technologies at SMART2023 (Patras, July 2023)
- Organiser – Industry 4.0 & Digital Transformation seminar (Geopolis, Larissa, May 2022)
- Participant, Open Doors 2026, University of Thessaly

### Voluntary service:

- Technology Helpdesk Coordinator, Athens 2004 Olympic Games Organising Committee (Patras football event, March 2004)