

DIMITRIS A. SARAVANOS

Professor

Structural Mechanics and Smart Materials
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Date of Birth: 25 Feb. 1958; **Nationality:** Greece, USA; **Marital Status:** Married, 2 children

EDUCATION

1988 Ph.D in Mechanical Engineering, The Pennsylvania State University, University Park, PA, USA.
1984 M.E. in Mechanical Engineering, Stevens Institute of Technology, Hoboken, NJ, USA.
1982 Diploma with Thesis, School of Mechanical Engineering, National Technical University of Athens.

CURRENT POSITION

2006-date Professor, Dept. of Mechanical Engineering & Aeronautics, University of Patras.
2002-2006 Associate Professor, Dept. of Mechanical Engineering & Aeronautics, University of Patras.
1997-2002 Assistant Professor, Dept. of Mechanical Engineering & Aeronautics, University of Patras.

PREVIOUS POSITIONS

1996-1999 Senior Research Associate, Ohio Aerospace Institute, Structural Dynamics Branch, Structures Division, NASA Glenn Research Center, Cleveland, Ohio.
1989-1996 Senior Research Associate, Ohio Aerospace Institute, Structural Mechanics Branch, Structures Division, NASA Glenn Research Center, Cleveland, Ohio.
1988-1989 NRC Research Associate, Structural Mechanics Branch, Structures Division, NASA Glenn Research Center, Cleveland, Ohio.
1984-1988 Graduate Research Assistant; Applied Research Laboratory; The Pennsylvania State University

CURRENT RESEARCH THRUSTS

Computational structural mechanics and dynamics, adaptive and morphing structures, multifunctional and intelligent materials, composite materials and structures, structural health monitoring, computational structural mechanics and dynamics, finite element methods, multi-scale mechanics.

TEACHING AND TRAINING

1999-date Teaches 3 undergraduate courses (Introduction to Finite Elements, FEA Methods for Structural Analysis; Structural Dynamics).
1 postgraduate course (Advanced Laminate Mechanics).
2010-date Co-supervises and participates in teaching of one undergraduate course every year (Introduction to Computer Science)

INSTITUTIONAL RESPONSIBILITIES

2008-2015 Director, Sector of Applied Mechanics Materials Technology and Biomechanics
2010-2017 Coordinator, Computational Lab., Dept. of Mechanical Engineering and Aeronautics
Committee Member: Computational Lab. Executive Committee (2000-2010), Aeronautics Committee (2009-date).

SUPERVISION AND MENTORING

Past: 8 graduated Ph.D students as supervisor; 3 post-doctoral fellows; 4 NASA research engineers; over 30 MSc Theses.
Ongoing: 6 Ph.D students as main supervisor; 2 post-doctoral fellows; 10 MSc Theses.

COMMISSIONS OF TRUST

- 2015, 2017 Chairman and member, ERC Products and Processing Engineering CoG Evaluation panel.
2013 -date Member, ERC Products and Processing Engineering CoG Evaluation panel.
ERC Evaluator (2011-date).
Proposal Evaluator: Germany (2014 FRIAS), Poland (2015 NCN), Irish Research Council (2016),
TUDelft LEaDing Fellows Postdocs Programme (2018)
2000-date Evaluator in over 30 faculty promotion committees; Main evaluator in 7 faculty promotion committees
(U. Patras, U. Thessaly, Poly. Torino, U. Polytecnica de Catalunya).
2000-date Ph.D Thesis Examiner (Greece, ETH, TUDelft, U. Rome-La Sapienza, DTU).

EDITORIAL DUTIES, CONFERENCE COMMITTEES, REVIEWING

Associate Editor:

Wind Energy, John Wiley (2011-date)

J. of Aerospace Science and Technology, Elsevier (2008-date)

Quest Editor: J. of Intelligent Materials, Systems and Structures (2008, 2012); Journal of Composite Materials
(2008);

Editorial Board: INCAS Bulletin, Romania

Member of Leading Conference Scientific Committees (2004- date): AIAA Adaptive Structures Conference; Intern.
Conference on Adaptive Structures Technologies (ICAST); Member of European Structural Health Monitoring
Workshop; SMASIS-ASME conference; ECCOMAS Thematic Conference on Smart Structures and Materials

ORGANIZATION OF INTERNATIONAL SCIENTIFIC CONFERENCES

- 2007 Organizer and Chairman, COMP-07: 6th International Symposium on Advanced Composite
Technologies
2011 Organizer and Chairman, ICAST2011 22nd International Conference on Adaptive Structures
Technologies

PROFESSIONAL AFFILIATIONS & SERVICE

Associate Fellow AIAA, Member ASME, Member TMS, Member Hellenic Engineering Chamber.

AWARDS

Thesis Advisor, 2nd Best Clean Sky II Joint Undertaking PhD Award (2018)

Thesis Advisor, Best European Ph.D in Wind Energy (2012), European Wind Energy Academy.

Space Act Award (2000), NASA Glenn Research Center.

Team Achievement Awards (1990, 1993, 1995, 2001), NASA Glenn Research Center.

NRC Research Associate Fellowship (1988)

PUBLICATION RECORD

81 Journal Articles, 110 Conference Papers, over 114 co-authors.

Citations: 3100 (Scopus), 4400 (Google Scholar); *h-index:* h-22 (WoS), h-28 (Scopus), h-33 (Google Scholar).

RESEARCH SUPPORT (1999-date)

- 2018-2021 Energy Autonomous System of Signal Processing and Wireless Transmission with Piezoelectric
elements for Wind Turbine Applications, (EvAυΣυ), GSRT – Research and Innovation Action,
(150,000Eu).
2018-2021 Distributed Smart Material Arrays for Low Frequency Broadband Active Noise and Vibration
Suppression in Transport Vehicles and Light Structures, (TRAVIC), GSRT – Research and Innovation
Action, (150,000Eu).
2018-2021 Development and Manufacturing of Intelligent Lightweight Composite Aircraft Container,
(INTELLICONT), H2020-CS2-2017-CFP06-LPA-02-16, (340,000Eu).
2016-2019 Technologies for Active Vibration and Acoustic Comfort (TAVAC), CS2-2014-CFP01-AIR-01-05,
GRA-717089 (197,000Eu).

- 2016-2018 CROR Blade-Out Impact Simulations and Sample Manufacturing (BLADEOUT), CS2-2014-CFP01-AIR-01-05, GRA-686813 (98,000Eu)
- 2014-2016 Fast Impact Cross-Analysis Methodology for Composite Leading Edge Structures (FIMAC), JTI-CS-2013-2-SGO-02-073, GRA-632420 (135,180Eu)
- 2014-2015 Flexible Sensor Cooperation for Structural Health Diagnosis/Prognosis, (Wireless-FLEX_Sense), JTI-CS-2013-2-GRA-01-054, GRA-6325064 (39,924Eu)
- 2012-2017 Innovative Wind Conversion Systems (10-20MW) for Offshore Applications (InnWind.Eu), FP7-ENERGY, GRA-308974 (350,000Eu)
- 2012-2015 Graphene and its Nanocomposites: Production, Properties and Applications, Thalys National Project.
- 2012-2014 Morphing Skin with a Tailored Non-Conventional Laminate (MOSKIN), FP7-Clean Sky SkyJTI-CS-2011-2-SFWA-01-040, GRA-298164 (84,000Eu)
- 2012-2012 Shape Memory Alloy Trailing Edge (SMYTE) FP7-CleanSky JTI-CS-2011-1-GRA-02-015 (35,000Eu).
- 2011-2014 Damage Detection and Structural Health monitoring in composite structures based on Lamb wave methods with Active Piezoelectric Sensors (45,000Eu), Herakleitos II National Project.
- 2011-2012 Wireless Integrated Strain Monitoring and Simulation System (WISMOS), CleanSky JTI-CS-2010-13-ECO-01-005 (40,000Eu).
- 2010-2013 International Institute of Multifunctional Materials for Energy Conversion (IIMEC), <http://imec.tamu.edu/>, NSF-USA, member.
- 2009-2014 Optimisation for low Environmental Noise impact Aircraft (OPENAIR), FP7 – TRANSPORT, Principal Investigator (200.000Eu).
- 2008-2009 Preliminary Studies on Damage Tolerant Strategies for Composite Damage Detection and Health Monitoring; EOARD/AFOSR Grant; (Univ. of Sheffield, Univ. of Patras); 50,000\$.
- 2005-2009 Integrated Wind Turbine Design; Int. Project; EU Research Framework FP6-Energy; Principal-Investigator (150.000Eu).
- 2005-2009 Aerospace Nanotube Hybrid Composite Structures with Sensing and Actuating Capabilities; EU Research Framework FP6-Aero; Co-Investigator.
- 2005-2006 “Smart Mechanical Structures with Stochastic Damage Self-Detection Capability”, Postgraduate Research Program-Pythagoras, Hellenic Ministry of Education, Co-Investigator.
- 2005-2007 International Collaboration on Predictive Methodologies for the Design of Lamb-Wave Piezoelectric Wafer Active Sensors for Structural Health Monitoring; National Science Foundation (NSF) – (Univ. of South Carolina, Univ. of Sheffield, Univ. of Patras).
- 2003-2006 Modeling of Electromechanical Behavior of Carbon Nanotubes and Nano-Composite Materials; Karatheodoris Research Program, Univ. of Patras; Principal Investigator.
- 2002-2006 Smart Piezoelectric Composites with Damage Self-Monitoring Capabilities; Graduate Research Program-Heracleitos, Hellenic Ministry of Education; Principal Investigator.
- 2000-2004 Wind Turbine Rotor Blades For Enhanced Aeroelastic Stability And Fatigue Life Using Passively Damped Composites-DAMPBLADE; 5th EU Research Framework - ENERGIE ENK6-CT2000-00320 (232,000Eu); Principal Investigator.
- 1999-2001 Design & Development of a Composite Bridge; National Research Program EPET-II, Inst. of Chemical Engineering; Co-investigator.
- 1999-2001 Mechanics and Finite Element Models for the Nonlinear Analysis of Composite Shells with Embedded Piezoelectric Elements, Karatheodoris Research Program, Univ. of Patras; Principal Investigator

INVITED Lectures

“Modeling, Characterization and Detection of Impacts on Composite Structures”, *Dept. of Aerospace Engineering, TUDelft*, Dec. 13, 2016.

“Shape Memory Alloy Morphing Airfoil Sections”, *CIMTEC 2016, 5th International Conference on Smart and Multifunctional Materials, Structures and Systems*, Perugia, Italy, June 6-9, 2016

“Linear and Nonlinear Lamb wave SHM methods for Composite Materials and Structures”, *DCAMM seminar*, Mar. 18, 2016, Dept. of Mechanical Engineering, Technical University of Denmark.

“Linear and Nonlinear Lamb wave SHM methods for Composite Materials and Structures”, *2nd International Conference on Airworthiness and Fatigue (ICAF-2014)*, Univ. of Patras, Greece.

“Nonlinear In-Situ Wave SHM Method for Composites Laminates using Active Piezoceramic Sensors”, *DAMAS 2013: 10th International Conference on Damage Assessment of Structures*, July 8-10, 2013, Trinity College Dublin, Dublin, Ireland.

“Structural Dynamics and Simulation of Wind Turbine Blades”, *SYSWIND Summer School*, 16-20 July 2012, Univ. of Patras, Greece

“Damping of Composite Laminates and Structures”, *Mechanical Engineering Dept., ETH Zurich*, Sept 7-8, 2011.

“A Nonlinear Damped Beam Finite Element for the Vibration of Composite Blades Under Large Deformations”, *Dept. of Aerospace Engineering, Texas A&M University*, College Station, TX, Mar. 2011.

“Layerwise Mechanics Models for Piezocomposite Materials and Structures”, *Dept. of Aerospace Engineering, Texas A&M University*, College Station, TX, Apr. 2005.

"Update on Mechanics and Analytical Models for Smart Piezoelectric Composite Structures," *5th Annual Workshop: Enabling Technologies for Smart Aircraft Systems, NASA Langley Research Center*, May 14-16, 1996.

"Layerwise Mechanics and Finite Elements for Smart Composite Structures with Piezoelectric Actuators and Sensors," *4th Annual Workshop: Advances in Smart Materials for Aerospace Applications, NASA Langley Research Center*, May 4-5, 1995.

CAREER BRAKES

1/5-30/9/1991 Military Subscription in Hellenic Air Force. Duties included research support in the R&D Center of The Hellenic Air Force. (1/6-31/8/1991).

REPRESENTATIVE JOURNAL ARTICLES

Nastos, C. and Saravanos, D.A. “A 2D Daubechies Finite Wavelet Domain Method for Transient Wave Response Analysis in Shear Deformable Laminated Composite Plates”, *Computational Mechanics*, March 2018, DOI:10.1007/s00466-018-1558-9.

Rekatsinas C. S., Siorikis D. K., Christoforou A. P. and Saravanos D. A. “Analysis of Low Velocity Impacts on Sandwich Composite Plates using Cubic Spline Layerwise Theory and Semi Empirical Contact Law”, *Composite Structures*, 2018, 194, pp. 158-169, doi.org/10.1016/j.compstruct.2018.03.081

Machairas T., Kontogiannis A., Karakalas A., Solomou A., Riziotis V. and Saravanos D.A. “Robust fluid-structure interaction analysis of an adaptive airfoil using shape memory alloy actuators”, *Smart Materials & Structures*, 2018

Rekatsinas C.S. and Saravanos D.A. “A Cubic Spline Layerwise Time Domain Spectral FE for Guided Wave Simulation in Laminated Composite Plate Structures with Physically Modeled Active Piezoelectric Sensors”, *Int. J. Solids and Structures*, Vol. 124C, , pp. 176-191, 2017; doi:10.1016/j.ijsolstr.2017.06.031.

Solomou A.G., Karakalas A., Machairas T.T. and Saravanos D. A. “Corotational Thermomechanically Coupled Formulation of Multi-Field Finite Element for the Geometrically Nonlinear Time Response of Multi-Layered Shape Memory Alloy Beams”, *Smart Mat. and Structures*, Vol. 26, No. 6, 2017; doi:10.1088/1361-665X/aa688c.

Siorikis D. K., Rekatsinas C. S., Christoforou A. P. and Saravanos D. A. “Experimental and Numerical Investigation of Contact Laws for the Rapid Simulation of Low-Energy Impacts on Laminated Composite Plates”, *Composite Structures*, Vol. 168, pp. 646–656, 2017; doi:10.1016/j.compstruct.2017.02.049

Nastos C.V., Theodosiou T.C., Rekatsinas C.S. and Saravanos D.A. "A Finite Wavelet Domain Method for the Rapid Analysis of Transient Dynamic Response in Rods and Beams", *Computer Modeling in Engineering & Science*, 107(5), 379:409, 2015.

Solomou A.G., Machairas T.T., Saravanos D. A., Hartl D.J. and Lagoudas D.C. “A Coupled Layered Thermomechanical Shape Memory Alloy Beam Element with Enhanced Higher Order Temperature Field Approximations”, *J. Intelligent Materials, Structures and Systems*, Feb. 2016, DOI: 10.1177/1045389X16629572

Rekatsinas C.S., Nastos C.V., Theodosiou T.C. and Saravanos D.A. “A Time-Domain High-Order Spectral Finite Element for the Simulation of Symmetric and Anti-symmetric Guided Waves in Laminated Composite Strips”, *Wave Motion*, 2015, pp. 1-19, DOI: 10.1016/j.wavemoti.2014.11.001.

Chrysochoidis N. A., Assimakopoulou T. T. and Saravanos D. A. “Non-linear Wave SHM Method Using an Active Nonlinear Piezoceramic Sensor for Matrix Cracking Detection in Composites”, *J. Intelligent Materials, Structures and Systems*, Sept. 2014; DOI:10.1177/1045389X14549865.

Theodosiou T.C. and Saravanos D.A., “Numerical Simulation of Graphene Fracture Using Molecular Mechanics Based Nonlinear Finite Elements”, *Computational Materials Science*, 82C (2014), pp. 56-65; doi: 10.1016/j.commatsci.2013.09.032.

Chortis D. I., Varelis D. S. and Saravanos D. A. “Linearized Frequencies and Damping in Composite Laminated Beams Subject to Buckling”, *ASME J. of Vibration and Acoustics*, vol. 135, no. 2, 2013; doi: 10.1115/1.4023051

Chortis D. I., Varelis D. S. and Saravanos D. A. “Prediction of Material Coupling Effect on Structural Damping of Composite Beams and Blades”, *Composite Structures*, 94 (2012) 1646–1655; doi:10.1016/j.compstruct.2011.12.004. (5)

Chrysochoidis N. A., Barouni A. K. and Saravanos D. A. “Delamination Detection in Composites Using Wave

Modulation Spectroscopy with a New Active Nonlinear Acousto-Ultrasonic Piezoelectric Sensor”, *J. Intelligent Materials, Structures and Systems*, December 2011, vol. 22, no. 18, 2193-2206; doi: 0.1177/1045389X11428363. (11)

Theodosiou T.C. and Saravanos D.A. “Numerical investigation of mechanisms affecting the piezoresistive properties of CNT-doped polymers using multi-scale models,” *Composites Science and Technology*, Vol. 70 (9), 2010, pp. 1312-1320; doi:10.1016/j.compscitech.2010.04.00.

Chrysochoidis N. A. and Saravanos D. A. “High Frequency Dispersion Characteristics of Smart Delaminated Composite Beams” *J. of Intelligent Material Systems and Structures*, Vol. 20:9, June 2009. (In top 10 cited list for the journal’s 2011 Impact Factor); doi: 10.1177/1045389X09102983. (4)

Plagianakos T. S. and Saravanos D. A. “Higher-Order Layerwise Laminate Theory for the prediction of Interlaminar Shear Stresses in Thick Composite and Sandwich Composite Plates”, *Composite Structures*, 87 (2009) 23–35; doi:10.1016/j.compstruct.2007.12.002. (36)

Chrysochoidis N. A. and Saravanos D. A. “Generalized Layerwise Mechanics for the Static and Modal Response of Delaminated Composite Beams with Active Piezoelectric Sensors”, *Int. J. of Solids and Structures*, Vol 44, No. 25-26, 2007, pp. 8751-8768; doi:10.1016/j.ijsolstr.2007.07.004.

Varelis D. and Saravanos D. A. “Coupled mechanics and finite element for non-linear laminated piezoelectric shallow shells undergoing large displacements and rotations,” *Int. J. of Numerical Methods in Engineering*, vol. 66, no. 8, 2006, pp. 1211-1233; doi: 10.1002/nme.1590.

Saravanos D. A., Varelis D., Plagianakos T. S. and Chrysochoidis N. “A Shear Beam Finite Element for the Damping Analysis of Tubular Laminated Composite Beams,” *Journal of Sound and Vibration*, Vol. 291, No. 3-5, April 2006, pp. 802-823; doi:10.1016/j.jsv.2005.06.045. (23)

Chrysochoidis N. A. and Saravanos D. A. “Assessing the Effects of Delamination on the Damped Dynamic Response of Composite Beams with Piezoelectric Actuators and Sensors,” *Smart Materials and Structures*, Vol. 13, No. 4, pp. 733-42, May 2004; doi:10.1088/0964-1726/13/4/01.

Plagianakos T. S. and Saravanos D. A. “High-Order Layerwise Mechanics and Finite Element for the Damped Dynamic Characteristics of Sandwich Composite Beams,” *Intern. Journal of Solids and Structures*, Vol. 41, No. 24-25, pp. 6853-6871, 2004; doi:10.1016/j.ijsolstr.2004.05.

Varelis D. and Saravanos D. A., “Coupled Buckling and Postbuckling Analysis of Laminated Piezoelectric Composite Plates with Large Displacement and Stress Nonlinearity,” *Int. J. of Solids and Structures*, Vol. 41, pp.1519-38, 2004; doi:10.1016/j.ijsolstr.2003.09.034.

Varelis D. and Saravanos D. A. “Nonlinear Coupled Mechanics and Buckling Analysis of Composite Plates with Piezoelectric Actuators and Sensors,” *Smart Materials and Structures*, Vol. 11, No. 3, pp. 330-336, Jun. 2002. (33)

Saravanos D.A. and Christoforou A. P. “Low-Energy Impact of Adaptive Cylindrical Laminated Piezoelectric-Composite Shells,” *Intern. J. of Solids and Structures*, Vol. 39, No. 8, May 2002, pp. 2257-79. (7)

Lee H. J. and Saravanos D.A. “Mixed Multi-Field Finite Element Formulation for Thermopiezoelectric Composite Shells,” *Int. J. of Solids and Structures*, Vol. 37, 2000, pp. 4949-4967. (66)

Saravanos D. A. and Heyliger P. R. “Mechanics and Computational Models for Laminated Piezoelectric Beams, Plates, and Shells,” *Applied Mechanics Reviews*, Vol. 52, No. 10, 1999, pp. 305-320.

Saravanos D. A. “Mixed Laminate Theory and Finite Element for Smart Piezoelectric Composite Shell Structures,” *AIAA J.*, Vol. 35, No. 8, pp. 1327-1333, 1997; (also NASA CR 198490, 1996).

Lee H.J. and Saravanos D.A. “Generalized Finite Element Formulation for Smart Multilayered Thermal Piezoelectric Plates,” *Intern. J. of Solids and Structures*, Vol. 34, No. 26, 1997, pp. 3355-3371; (also, *NASA TM-106990*).

Heyliger P. R., Pei K. C. and Saravanos D. A., “Layerwise Mechanics and Finite Element Model for Laminated Piezoelectric Shells,” *AIAA Journal*, Vol. 34, No. 11, pp. 2353-2360, 1996.

Saravanos D. A., Heyliger P. R. and Hopkins D.A. “Layerwise Mechanics and Finite Element for the Dynamic Analysis of Piezoelectric Composite Plate Structures,” *Int. J. of Solids and Structures*, Vol. 34, No. 3, 1997, pp. 359-378; (also *NASA TM-107232*, 1996).

Birman V., Saravanos D.A. and Hopkins D.A., “Micromechanics of Composites With Shape Memory Alloy Fibers in Uniform Thermal Fields,” *AIAA Journal*, Vol. 34, No.9, Aug. 1996, pp. 1905-1912.

Lee H. J. and Saravanos D. A., “Coupled Layerwise Analysis of Thermopiezoelectric Smart Composite Beams,” *AIAA Journal*, Vol. 34, No. 6, June 1996, pp. 1231-1237; (Also, *NASA TM 106889*).

Saravanos D. A. and Hopkins D. A., “Effects of Delaminations on the Damped Dynamic Characteristics of Composite Laminates: Mechanics and Experiments,” *J. of Sound and Vibration*, Vol. 192, No. 5, May 1996, pp. 997-993; (also, *NASA TM 106862*).

Heyliger P. R. and Saravanos D. A., “Exact Free-Vibration Analysis of Laminated Plates with Embedded Piezoelectric Layers,” *J. of Acoustical Society of America*, Vol. 98, No. 3, 1995, pp. 1547-1557. (154)

Saravanos D.A. and Heyliger P.R. “Coupled Layerwise Analysis of Composite Beams with Embedded Piezoelectric

Sensors and Actuators," *J. of Intelligent Material Systems and Structures*, Vol. 6, No. 3, 1995, pp. 350-363. (also, NASA CR 195313)

Saravanos, D. A. and Chamis, C. C., "Unified Micromechanics of Damping for Unidirectional and Off-Axis Fiber Composites," *J. of Composites Technology and Research*, Vol. 12, No. 1, 1990, pp. 31-40.