

# **Helio D. S. Matos, Ph.D., P.E.**

Department of Mechanical, Industrial, and Systems Engineering

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[Google Scholar](#); [Research Gate](#); [LinkedIn](#); [University of Rhode Island Profile](#)

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## **BIOGRAPHICAL SKETCH**

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Dr. Helio Matos earned his Bachelor and Master of Science degrees in Mechanical Engineering from the University of Massachusetts Dartmouth in 2013 and 2014, respectively, then his Doctorate from the University of Rhode Island in 2017. His doctoral research focused on the dynamic behavior of structures in extreme underwater environments. He was a senior engineer at General Dynamics Electric Boat, where he developed constitutive equations that describes the behavior of underwater composite structures. Then he worked as a senior mechanical engineer at the U.S. Naval Undersea Warfare Center Division Newport, where he performed structural dynamics finite element analysis and composites research. Currently, he is an Assistant Professor of Mechanical Engineering at the University of Rhode Island, where he conducts experimental and computational studies on the dynamic loading of materials and structures.

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## **RESEARCH SUMMARY**

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During recent years Dr. Matos has performed extensive experiments and simulations of materials and structures in extremely dynamic environments. His expertise is in the field of composite mechanics, structural dynamics, and shock physics, and his research interests are on the performance of composites and polymers in environments such as blast loading and transition temperatures. The methodology used in Dr. Matos' research predominantly experimental, but it actively incorporates numerical simulations and theoretical modeling. Dr. Matos has active fundamental and applied research in the field of advanced materials and underwater blast sponsored by industry partnerships (SBIRs and STTRs), DoD grants, and different institutions (such as 401 Tech Bridge and the National Institute for Undersea Vehicle Technology (NIUVT)).

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## **EDUCATION**

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### **Doctor of Philosophy (Ph.D.) in Mechanical Engineering and Applied Mechanics, 2017**

The University of Rhode Island, Kingston, RI

### **Master of Science (M.S.) in Mechanical Engineering, 2014**

The University of Massachusetts Dartmouth, North Dartmouth, MA

### **Bachelor of Science (B.S.) in Mechanical Engineering, 2013**

The University of Massachusetts Dartmouth, North Dartmouth, MA

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## **LICENSE**

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### **Professional Engineering (P.E.) License in Mechanical Engineering, Dec. 2016 - Present**

- Specializing in Mechanical Systems and Materials; Issuing State: Massachusetts

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## **PROFESSIONAL EXPERIENCE**

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### **Assistant Professor, December 2019 – Present**

The University of Rhode Island, Kingston RI

- Perform experimental and computational research of fluid-structure interactions for materials in both incompressible and compressible fluids (representative of underwater and flight

environments) while subjected to shock and blast loading conditions. The focus of this research is on the structural and materials response to extreme environments.

**Adjunct/Part-Time Professor, January 2019 – December 2019**

The University of Massachusetts Dartmouth, Dartmouth MA (Spring 2019)

The University of Rhode Island, Kingston RI (Fall 2019)

- Taught Mechanics of Composite Materials and Experimental Mechanics.

**Senior Mechanical Engineer, September 2018 – January 2020**

U.S. Naval Undersea Warfare Center (NUWC), Newport RI

- Developed and analyzed finite element simulations of marine structures subjected to static and transient loading conditions using Abaqus CAE and LS Dyna.

**Senior Systems Modeling Engineer, June 2017 – September 2018**

General Dynamics – Electric Boat, New London CT

- Performed material and structural dynamics research through characterization tests and computational simulations. These studies characterized the dynamic response and damage mechanisms of structures made of composites, viscoelastic, and hyperplastic materials.

**TEACHING COURSES**

The University of Massachusetts Dartmouth, Dartmouth MA

- Mechanics of Composite Materials, MNE 490 and MNE 517, Spring 2019

The University of Rhode Island, Kingston RI

- Mechanical Engineering Experimentation, MCE 414, Fall 2019
- Computational Methods in Solid Mechanics, MCE 561, Fall 2020
- Extreme Loading and Mechanics, MCE 680, Spring 2021

**GRADUATE STUDENT ADVISING**

The University of Rhode Island, Kingston RI

**Doctors of Philosophy**

- Birendra Chaudhary, 2025, Major Advisor

**Masters of Science**

- Matthew Leger, 2022, Major Advisor
- Valentina Rossell, 2022, Co-Advisor

**RESEARCH FUNDING AWARDS**

1. *“Composite Double Hull Structures,”* Electric Boat Independent Research and Development (New London, CT), \$150,000; 01/01/2018-12/31/2018, Principal Investigator
2. *“Effects of Near Field Explosives on Structures,”* Naval Undersea Warfare Center (NUWC) Division Newport (Newport, RI) through the Office of Naval Research (ONR), \$30,000; 10/01/2018-09/30/2019, Principal Investigator
3. *“Development of an operationally relevant real-time in-situ health monitoring system; AF STTR Phase I,”* Nautilus Defense (Pawtucket, RI) through the A.F., \$17,500; 03/01/2020 – 06/01/2020; Principal Investigator.
4. *“Finite Element Analysis to Evaluate the Performance of a Composite Pressure Vessels Subjected to Full Ocean Depth Pressures; R.I. Commerce Voucher,”* Goetz Composites (Bristol, RI) through the Rhode Island Commerce, \$47,734; 06/01/2020 – 09/14/2020, Co-Principal Investigator.

5. “3D Printed Pressure Vessels; Navy SBIR Phase I”, Goetz Composites (Bristol, RI) through ONR, \$23,000; 07/08/2020 – 12/31/2020, Principal Investigator
6. “Bubble Interaction and Collapse on Structures from Near-Field Explosions,” NIUVT through ONR, \$650,000; 01/01/2020 – 12/31/2021, Co-Principal Investigator.
7. “Advanced Polymer Composite Structures for Tuned Acoustic and Impact Attenuation,” NIUVT through ONR, \$400,000; 08/22/2020 – 08/21/2022, Principal Investigator.
8. “Advanced Double Hull Structural Configurations for Undersea Vehicles and Weapons,” NIUVT through ONR, \$580,000; 08/22/2020 – 08/21/2022, Principal Investigator.
9. “Blast Performance of Advanced Inflatable Structures,” NIUVT through ONR, \$475,452; 08/22/2020 – 08/21/2022, Co-Principal Investigator.
10. “Electromechanical Testing of Novel Textile-Integrated Systems,” 401 Tech Bridge (Portsmouth, RI), \$35,000; 01/01/2021 – 08/31/2021, Co-Principal Investigator
11. “The Development and Commercialization of Composite Deep-Sea Pressure Vessels,” 401 Tech Bridge (Portsmouth, RI), \$35,000; 01/01/2021 – 08/31/2021, Principal Investigator
12. “Composite-Integrated Electrical Networks for Volume-Optimized Airframes; AF STTR Phase I,” Nautilus Defense (Pawtucket, RI) through the A.F., \$45,000; 01/01/2021 – 08/01/2021; Principal Investigator.
13. “3D Printed Pressure Vessels; Navy SBIR Phase II”, Goetz Composites (Bristol, RI) through ONR, \$112,500; 03/01/2021 – 08/31/2022, Principal Investigator.
14. “Complex Underwater Implosion Phenomena and Mitigation of Implosion and Implosion Pulses in Marine Composite Structures”, ONR, \$150,000, 06/01/2021 – 05/31/2024. Co-Principal Investigator.

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## PUBLICATIONS

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### JOURNALS

1. Matos, H., Rice, J. M., Kim, Y. K., & Lewis, A. F. (2016). *Impact force loss behavior of flocked surfaces*. Textile Research Journal. doi:10.1177/0040517516679149
2. Gupta, S., Matos, H., Leblanc, J. M., & Shukla, A. (2016). *Shock initiated instabilities in underwater cylindrical structures*. Journal of the Mechanics and Physics of Solids. doi:10.1016/j.jmps.2016.05.034
3. Matos, H., & Shukla, A. (2016). *Mitigation of Implosion Energy from Aluminum Structures*. International Journal of Solids and Structures. doi:10.1016/j.ijsolstr.2016.09.030
4. Gupta, S., Matos, H., LeBlanc, J. M., & Shukla, A. (2016). *Pressure signature and evaluation of hammer pulses during underwater implosion in confining environments*. The Journal of the Acoustical Society of America. doi:10.1121/1.4960591
5. Pinto, M., Matos, H., Gupta, S., & Shukla, A. (2016). *Experimental Investigation on Underwater Buckling of Thin-Walled Composite and Metallic Structures*. Journal of Pressure Vessel Technology. doi:10.1115/1.4032703
6. Matos, H., Gupta, S., & Shukla, A. (2018). *Structural Instability and Water Hammer Signatures from Shock-Initiated Implosions in Confining Environments*. Mechanics of Materials. doi:10.1016/j.mechmat.2016.12.004
7. Javier, C., Matos, H., & Shukla, A. (2018). *Hydrostatic and blast-initiated implosion of environmentally degraded Carbon-Epoxy composite cylinders*. Composite Structures. doi:10.1016/j.compstruct.2018.04.055
8. Shukla, A., Gupta, S., Matos, H., & Leblanc, J. M. (2018). *Dynamic Collapse of Underwater Metallic Structures – Recent Investigations: Contributions after the 2011 Murray Lecture*. Experimental Mechanics. doi:10.1007/s11340-017-0364-1

9. Matos, H., Javier, C., Leblanc, J., & Shukla, A. (2018). *Underwater near-field blast performance of hydrothermally degraded carbon–epoxy composite structures*. Multiscale and Multidisciplinary Modeling, Experiments, and Design. doi:10.1007/s41939-017-0004-6
10. Matos, H., Kishore, S., Salazar, C., & Shukla, A. (2020). *Buckling, vibration, and energy solutions for underwater composite cylinders*. Composite Structures, 244, 112282. doi:10.1016/j.compstruct.2020.112282
11. Javier, C., Galuska, M., Papa, M., LeBlanc, J., Matos, H., Shukla, A. (2020). *Underwater Explosive Bubble Interaction with an Adjacent Submerged Structure*. Journal of Fluids and Structures. doi:10.1016/j.jfluidstructs.2020.103189
12. Wanchoo, P., Matos, H., Rousseau, C.R., Shukla, A. (2021). *Investigations on air and underwater blast mitigation in polymeric composite structures – A review*. Composite Structures. doi:10.1016/j.compstruct.2020.113530

#### **CONFERENCE PROCEEDINGS**

1. Matos, H., Gupta, S., Leblanc, J. M., & Shukla, A. (2017). *Confined Underwater Implosions Using 3D Digital Image Correlation*. Dynamic Behavior of Materials, Volume 1 Conference Proceedings of the Society for Experimental Mechanics Series, 147-151.
2. Matos, H., Javier, C., Leblanc, J. M., & Shukla, A. (2018). *Underwater Blast Response of Weathered Carbon Composite Plates*. Dynamic Behavior of Materials, Volume 1, 103-107.

#### **BOOK CHAPTERS**

1. Matos, H., Pinto, M., Shukla, A. (2018). *Mitigation of Energy Emanating from Imploding Metallic and Composite Underwater Structures*. Gopalakrishnan, S., Rajapakse, Y., (Eds), Blast Mitigation Strategies in Marine Composite and Sandwich Structures. Springer Nature. ISBN 978-981-10-7169-0
2. Shukla, A., Salazar, C., Kishore, S., & Matos, H. (2020). *Dynamic Response of Composite Structures in Extreme Loading Environments*. Advances in Thick Section Composite and Sandwich Structures, 1–42. doi: 10.1007/978-3-030-31065-3\_1