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Engineering & Scientific Consulting

Julian Hallai, Ph.D., MBA, P.E., PMP

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Professional Profile

Dr. Hallai specializes in solid mechanics, particularly applied to tubular structures such as pipelines, flowlines, and risers, as well as naval architecture for floating structures and their mooring systems. He is an Associate Editor for the ASME Journal of Pressure Vessel Technology and has 20 years of experience and expertise in deep water offshore drilling and production systems.

Dr. Hallai is a Lecturer in the Department of Mechanical Engineering at the University of Houston. He has expertise in computational (Finite Element Analysis: FEA) and experimental solid mechanics including model development, material characterization, calibration, verification, and validation for the design of structures, development of products, analysis of unanticipated events, prediction of behavior under extreme conditions and integrity management. He is a member of the ASME Subcommittee on Verification, Validation, and Uncertainty Quantification in Computational Solid Mechanics (VVUQ 10) and a scientific committee member and organizer of the International Conference on Ocean, Offshore & Arctic Engineering (OMAE).

He has expertise in non-linear structural analysis and failure modes including yielding, global and local buckling, fracture, and fatigue. He has developed methods for the dynamic analysis of mooring systems and their optimization. Dr. Hallai is skilled in offshore pipeline and riser installation methods and has extensive experience in hydrogen embrittlement of tubular structures transporting sour products (containing H2S). His experimental work has ranged from standard testing techniques to novel small-scale and full-scale methods.

Prior to joining Exponent, Dr. Hallai led R&D programs for ExxonMobil delivering high-impact solutions to challenges such as ultra-deep waters, higher pressures and temperatures, more corrosive environments, longer service lives and more demanding geographic areas. Dr. Hallai also provided solutions to ensure safe and economical operations worldwide including fitness-for-service, integrity management, and life extension assessments.

Dr. Hallai's academic work included investigating complex problems involving the interaction of material instabilities with structural instabilities and developing methods for the characterization of unstable materials such as carbon steels with Lüders bands and Nickel-Titanium shape memory alloys (NiTi SMA).

Academic Credentials & Professional Honors

M.B.A., Business Administration, Quantic School of Business and Technology, 2022

Ph.D., Engineering Mechanics, University of Texas, Austin, 2011

M.S.E., Engineering Mechanics, University of Texas, Austin, 2008

M.S.E., Naval Architecture and Marine Engineering, University of São Paulo, 2003

B.S.E., Naval Architecture and Marine Engineering, University of São Paulo, 2000

Advanced Skills Milestone in Pipelines and Risers, ExxonMobil, 2018

OMAE Conference Appreciation Award, ASME, 2018

Max L. Williams Endowed Graduate Fellowship in Mechanics of Solids, Structures, and Materials, 2011

Roberto Rocca Education Program Fellowship, 2007

The University of Texas at Austin Graduate School Recruitment Fellowship, 2006

Brazilian Navy Award, 2000

Brazilian Society of Naval Engineering Award, 2000

Licenses and Certifications

Professional Engineer Mechanical, California, #43137

Professional Engineer Mechanical, Louisiana, #0049834

Professional Engineer, New York, #111920

Professional Engineer Mechanical, Rhode Island, #PE.0015923

Professional Engineer Mechanical, Texas, #118871

Professional Engineer Petroleum, Texas, #118871

Professional Engineer Naval Architecture/Marine Engineering, Texas, #118871

Project Management Professional (PMP)

Academic Appointments

Lecturer of Subsea Engineering, Department of Mechanical Engineering, Cullen College of Engineering, University of Houston, since 2021

Prior Experience

R&D Program Lead, ExxonMobil, 2012-2020

Graduate Researcher & Adjunct Faculty, The University of Texas at Austin, 2006-2011

Pipelines and Risers Engineer, Petrobras, 2004-2006

Pipelines and Risers Engineer, Intecsea, 2003-2004

Undergraduate and Graduate Researcher, University of São Paulo, 1999-2003

Professional Affiliations

American Society of Mechanical Engineers (ASME)

- Member of VVUQ 10 Subcommittee (Verification, Validation, and Uncertainty Quantification in Computational Solid Mechanics)
- Scientific Committee Member and Organizer of the International Conference on Ocean, Offshore & Arctic Engineering (OMAE)

Society of Petroleum Engineers (SPE)

Society of Naval Architects and Marine Engineers (SNAME)

Houston Intellectual Property Law Association (HIPLA)

Languages

Hungarian

Italian

Portuguese

Spanish

Patents

US Patent 9,670,740: Drilling Riser with Distributed Buoyancy, June 2017 (with Fenz DM)

CA Patent 2977364C: Drilling Riser with Distributed Buoyancy, February 2019 (with Fenz DM)

US Patent 10,065,712: Floating Modular Protective Harbor Structure and Method of Seasonal Service Extension of Offshore Vessels in Ice-Prone Environments, September 2018 (with Krstulovic-Opara N)

CA Patent 3046622C: Floating Modular Protective Harbor Structure and Method of Seasonal Service Extension of Offshore Vessels in Ice-Prone Environments, February 2020 (with Krstulovic-Opara N)

PCT Patent Application WO2022/150241 A1: Process for protecting carbon steel pipe from sulfide stress cracking in severe sour service environments, Filed Jan 7, 2021 (with Baker DA, Gordon PA, Jun, HJ, Ozekcin, A, Srivastava, V, Thirumalai, NS)

Publications

Hilbert, LB, Hallai, JF. Natural Gas Production in Extreme Weather. Pipeline & Gas Journal, June 2021; Vol. 248, No. 6.

Hong JK, Brongers M, Kalyanam S, Hioe Y, Wilkowski G, Zeng Y, Hallai, JF. Flaw Design for d-c EP Monitoring of Crack Initiation and Growth During Full-Size Pipe Experiments. ASME 2020 Pressure Vessels & Piping Conference, PVP2020-21579, Minneapolis, MN, July 19-24, 2020.

Neeraj T, Srivastava V, Hallai JF, Ma N, Sarosi P, Jun H, Baker D. Hydrogen Permeation, Absorption and Trapping in Carbon Steels: A Comparison of Line Pipe and OCTG Steels. The Twenty-ninth International Ocean and Polar Engineering Conference, Honolulu, Hawaii, June 16-21, 2019.

Liu Y, Kyriakides S, Hallai JF. Reeling of Pipe with Lüders Bands. International Journal of Solids and Structures 2015; 72: 11-25.

Srivastava V, Hallai JF, Campbell B, Kokkinis T. Dynamic Response of Submerged Buoys Disconnected at Large Vessel Offsets. Arctic Technology Conference, OTC24563, Houston, Texas, February 10-12, 2014.

Hallai JF, Kyriakides S. Underlying Material Response for Lüders-Like Instabilities. International Journal of Plasticity 2013; 47: 1-12.

Hallai JF, Kyriakides S. On the Bending of Tubes with Lüders Bands: Influence of Geometric and Material Parameters. Proc. International Conference on Ocean, Offshore and Arctic Engineering, OMAE2012-83604, Rio de Janeiro, Brazil, July 1-6, 2012.

Hallai JF, Kyriakides S. On the Effect of Lüders Bands on the Bending of Steel Tubes. Part I: Experiments. International Journal of Solids and Structures 2011; 48: 3275-3284.

Hallai JF, Kyriakides S. On the Effect of Lüders Bands on the Bending of Steel Tubes. Part II: Analysis. International Journal of Solids and Structures 2011; 48: 3285-3298.

Hallai JF, Kyriakides S. Effect of Lüders Bands on the Bending Capacity of Steel Tubes. Proc. International Conference on Ocean, Offshore and Arctic Engineering, OMAE2010-20982, Shanghai, China, June 6-11, 2010.

Hallai JF, Augusto OB. Mooring Line Damping. Proc. Pan-American Congress of Naval Engineering, Maritime Transportation and Port Engineering, IPEN CT7-23, Guayaquil, Ecuador, October 24-28, 2005.

Hallai JF. Influence of Soil Properties on the Behavior of Heated On Bottom Pipelines. Proc. Rio Pipeline Conference & Exposition, IBP1071_05, Rio de Janeiro, Brazil, October 17-19, 2005.

Azevedo FB, Solano RF, Hallai JF, Bomfimsilva CT. Final Design and Installation Constraints of Shallow Water Oil Pipelines at the Capixaba North Terminal Offshore Brazil. Proc. International Conference on Ocean, Offshore and Arctic Engineering, OMAE2005-67400, Halkidiki, Greece, June 6-11, 2005.

Presentations

Sobotka J, Popelar C, Hickey F, Hallai JF, Zeng, Y. A New Test Specimen to Determine Environmentally-Assisted Cracking Threshold. The Minerals, Metals & Materials Society (TMS) 2022 Annual Meeting & Exhibition, Anaheim, California, February 27-March 3, 2022. (Submitted).

Hudson PJ, Hallai JF. Passing Vessels & Bank Effect: A Naval Architecture Perspective. Crescent River Port Pilots' Association, New Orleans, Louisiana, June 22-24, 2021.

Hallai JF, Kyriakides S. Determination of the Material Response for Lüders-like Instabilities. ASME 2013 International Mechanical Engineering Congress & Exposition, IMECE2013-66901, San Diego, California, November 15-21, 2013.

Hallai JF, Kyriakides S. On the Modeling of the Interaction of Lüders Bands with Structural Instabilities of Steel Tubes Under Bending. ASME Applied Mechanics and Materials Conference McMat-2011, McMat2011-4105, Chicago, Illinois, May 31-June 2, 2011.

Hallai JF, Kyriakides S. Material and Structural Instabilities in Tubes with Lüders Bands under Bending. Kyriakides-Liechti Symposium: Advances in Solid and Structural Mechanics, In celebration of the 60th Birthdays of Stelios Kyriakides and Kenneth M. Liechti, Austin, Texas, May 13-14, 2011.

Hallai JF, Kyriakides S. Inelastic Bending and Collapse of Tubes with Lüders Bands. Society of

Engineering Science 47th Annual Technical Meeting, 4-8-1-2, Ames, Iowa, October 4-6, 2010.

Hallai JF, Kyriakides S. Effect of Lüders Bands on the Response and Stability of Steel Tubes under Bending. 16th U.S. National Congress of Theoretical and Applied Mechanics, USNCTAM2010-461, State College, Pennsylvania, June 27-July 2, 2010.

Kyriakides S, Hallai JF, Ok A. The Effect of Lüders Bands on Localization and Propagation of Curvature of Steel Tubes Under Pure Bending. 28th International Conference on Ocean, Offshore and Arctic Engineering, OMAE2009-79755, Honolulu, Hawaii, May 31-June 5, 2009.

Editorships & Editorial Review Boards

Associate Editor for the ASME Journal of Pressure Vessel Technology

Peer Reviews

International Journal of Solids and Structures

Journal of the Mechanics and Physics of Solids

European Journal of Mechanics A/Solids

Journal of Pressure Vessel Technology

International Conference on Ocean, Offshore & Arctic Engineering (OMAE)

International Ocean and Polar Engineering Conference (ISOPE)

International Pipeline Conference (IPC)

The Society of Naval Architects and Marine Engineers (SNAME) Offshore Symposium

World Petroleum Congress (WPC)

Offshore Technology Conference (OTC)