DESIGN RESEARCH ENGINEERING
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Jose D. Mesa, Ph.D.
Senior Engineering Consultant

Professional Specialization

Dr. Jose Mesa is a multidisciplinary engineering expert with experience spanning transportation and civil engineering, naval and offshore engineering, aerospace engineering, and digital engineering. His work includes evaluation of roadway and bridge geometry, safety features, and retrofit feasibility for existing infrastructure, as well as application of design guidance in engineering and litigation contexts.

Dr. Mesa specializes in advanced structural and fluid–structure interaction analysis, integrating finite-element (FEM) and computational fluid dynamics (CFD) methods to assess safety, performance, and life extension of complex systems. His experience includes full-scale aircraft fatigue testing, offshore structural integrity assessments in the Gulf of Mexico, and evaluation of vibration, fatigue, and load-path behavior in constrained structures such as long-span bridges.

He also applies data analytics and digital engineering tools to evaluate crash trends, operational performance, and safety improvements, translating complex technical findings into clear, litigation opinions, regulatory review, and stakeholder decision-making.

Specialization Overview:

Transportation, Roadway, and Bridge Engineering Experience

- Formal academic training in transportation engineering, including roadway geometric design, traffic operations, and transportation safety, grounded in AASHTO design principles.
- Professional experience evaluating roadway and bridge geometry, cross-sections, shoulders and refuge areas, taper geometry, sight distance, alignment, and operational constraints for existing facilities.
- Engineering evaluation of bridge structures incorporating applicable design standards.
- Experience analyzing crash data, traffic volumes, and safety performance metrics to evaluate roadway safety trends and the effectiveness of operational and geometric countermeasures.
- Experience assessing feasibility of roadway and bridge retrofit alternatives, considering structural constraints, load paths, foundation capacity, constructability, and cost.
- Experience with traffic control and operations, including traffic signal timing and sequencing, intersection geometry, stopping sight distance, and evaluation of traffic control devices and signage for consistency with MUTCD requirements.

Structural Engineering

- Formal academic and professional training in structural engineering, including reinforced concrete, prestressed concrete, steel structures, and structural mechanics.
- Experience with concrete mix design and evaluation of concrete material performance, including strength, durability, and serviceability considerations for civil infrastructure.
- Engineering evaluation of existing concrete and asphalt structures, including assessment of material condition, degradation, reliability, and remaining service life for roadway and bridge applications.
- Structural analysis and design of steel structures, including truss and frame systems, with experience evaluating load effects, stress distribution, and structural behavior under service and extreme loading.
- Experience with fatigue analysis and life-extension assessment of structural components, including evaluation of cyclic loading (earthquake engineering) effects relevant to bridges and transportation infrastructure.
- Assessment of structural feasibility and retrofit alternatives for existing facilities, including implications of added dead load, live load redistribution, constructability constraints, and interaction with existing foundations and substructures.

Specialization Overview *(continued)*

Maritime Engineering & Offshore Engineering

- Vessel stability, hydrodynamics, and seakeeping analysis for safe and efficient marine operations.
- Fluid–structure interaction analysis for slamming, impact, and hydroelastic response of marine structures.
- Marine and naval vibration analysis, including machinery-induced and flow-induced excitation.
- Design, analysis, and testing of marine components and systems.
- Offshore riser and pipeline design and analysis, including fatigue and operational loading considerations.
- Structural integrity assessments of offshore hulls and marine structures under environmental and operational loads.
- Mooring system analysis and fatigue evaluation.

Aerospace Engineering

- Experience with full-scale aircraft fatigue testing and structural component evaluation.
- Development, execution, and interpretation of experimental test campaigns for structural performance and durability.
- Aeroelasticity and fluid–structure vibration analysis.
- Composite material analysis, design, and structural behavior assessment.

Digital Engineering, Data Analytics & Smart Systems

- Application of digital twin concepts and virtual prototyping for complex engineering systems.
- Coupled finite element (FEM) and computational fluid dynamics (CFD) modeling for structural, fluid, and FSI problems.
- Development of data analytics and machine learning models for predictive maintenance, performance optimization, and life-extension assessment.
- Integration of embedded sensor systems for real-time monitoring, condition assessment, and post-event integrity evaluation.
- Design and implementation of sensor-based monitoring frameworks to support operational decision-making and risk mitigation.
- Translation of complex engineering and monitoring data into clear, defensible visual dashboards for technical and non-technical stakeholders.
- Development of custom engineering software tools for automation, analysis, and workflow optimization

Field Inspection, Measurements & Applied Engineering Assessment

- Planning and execution of field inspections for marine, offshore, structural, and transportation assets.
- Selection and application of appropriate measurement technologies for geometry verification, condition assessment, and performance evaluation.
- Integration of field observations with analytical and numerical models to validate assumptions and engineering conclusions.
- Experience using inspection data to support design verification, retrofit feasibility, and safety evaluations.

Jose D. Mesa, Ph.D.

EDUCATION

University of Puerto Rico, Mayaguez
B.S. Civil Engineering Magna Cum Laude, 2013
Structural and Transportation Engineering Concentration
B.S. Surveying Magna Cum Laude, 2015

University of Michigan, Ann Arbor
M.S.E. Naval Architecture and Marine Engineering, 2015
M.S.E. Aerospace Engineering, 2016
Naval Architecture and Marine Engineering, 2018
Ph.D. Dissertation Title: “Hydroelastic Analysis of Aluminum and Composite High-Speed Planing Craft Structures During Slamming"

CERTIFICATIONS

Coursera
Database Design and Basic SQL in PostgreSQL (University of Michigan), 2023

Cornell University *(eCornell), Ithaca, NY*
Data Science with SQL and Tableau, 2022
Python for Data Science, 2022
Machine Learning, 2020
Software Development in Python, 2020

Chevron Corporation*, Houston, TX*
Chevron Data Science Development Program (DSDP), 2020

University of Michigan*, Ann Arbor, MI*
Graduate Teacher Certificate Program, 2018
Rackham Diversity, Equity and Inclusion (DEI) Professional Development Certificate, 2018

University of Puerto Rico*, Mayaguez, PR*
Certificate Environmental Engineering & Water Resources, 2013

APPOINTMENTS

Design Research Engineering, Tomball, TX USA
Senior Engineering Consultant August 2023 - Present

Anaconda Inc., Houston, TX USA
Staff Software Engineer March 2024 - Present
Senior Software Engineer January 2023 - March 2024
Advance Software Engineer March. 2022 - January 2023

Chevron Corporation, Houston, TX USA
Facilities Engineer, Chevron Technology Center Oct. 2018 - March 2022

University of Michigan, Ann Arbor, MI USA
Graduate Student Researcher, Dept. of Naval Architecture & Marine Engineering Sep. 2013 – 2018

APPOINTMENTS (continued)

Boeing Company, Everett/Renton, WA USA
777-X Airframe Fatigue Test Engineer, Boeing Test & Evaluation (BT&E) Aug. - Nov. 2016
P8-A Airframe Fatigue Test Engineer, Boeing Test & Evaluation (BT&E) May 2013 - Aug. 2016

Naval Research Enterprise Internship Program, West Bethesda, MD USA
Research Assistant, Computational Hydromechanics Team (Carderock) May - July 2015

Caribbean Coastal Ocean Observation System (CariCoos), Mayaguez, PR
Research Assistant, Field and Numerical Coastal Hazards Division Aug. 2011 - Aug. 2013

University of Michigan SROP, Ann Arbor, MI USA
Intern, Dept. of Naval Architecture & Marine Engineering June - Aug. 2012

University of Puerto Rico, Mayaguez, PR
Department of Energy -Scholarship Fellow, Dept. of Civil Engineering and Surveying Jan. - July 2012
Research Focus: Earthquake Engineering

U.S. Army Corps of Engineers-ERDC-CHL, Vicksburg, MS USA
Intern, Coastal and Hydraulics Laboratory (CHL) June - Aug. 2011

University of Puerto Rico, Mayaguez, PR
PR-LASMP Scholarship Fellow, Dept. of Engineering Science and Materials Aug. 2010 - May 2011
Research Focus: Coastal Hydrodynamics

Stevens Institute of Technology, Hoboken, NJ USA
Intern, Center for Secure and Resilient Maritime Commerce June - Aug. 2010

University of Puerto Rico, Mayaguez, PR
DoE-Scholarship Fellow, Dept. of Engineering Science and Materials Jan. - Dec. 2010
Research Focus: Transportation Optimization

University of Puerto Rico, Mayaguez, PR
Research Assistant, Dept. of Engineering Science and Materials Aug. 2009 - May 2010
Research Focus: Material Science

HONORS & AWARDS

Everyday Excellence - Chevron Company Awards & Recognition by Peer Nomination
- 9 Recognition's 2021
- 8 Recognition's 2020
- 2 Recognition's 2019

Measure Value - Human Energy - Chevron Company Awards & Recognition by Management Nomination
- 2 Growing Capabilities Recognition 2021
- 1 Building Relationships Recognition 2020
- 1 Delivering Results - Innovation Recognition 2020
- 2 University Recruiting Special Recognition Recognition's 2021

Richard F. and Eleanor A. Towner Prize for Distinguished Academic Achievement 2018
College of Engineering, University of Michigan

HONORS & AWARDS (continued)

Distinguished Leadership Award 2018
College of Engineering, University of Michigan

Nominee for the Richard and Eleanor Towner Prize for Outstanding Ph.D. Research 2017
College of Engineering, University of Michigan

Ph.D. Student Achievement Award 2017
*University of Mich*igan Center For Engineering Diversity & Outreach

Rackham Development Leaders Program (RDLP) 2017 – 2018
University of Michigan

Civil Engineering & Surveying Departmental Best Student Award 2015
Civil Engineering & Surveying Department, University of Puerto Rico

University of Michigan, Rackham Merit Fellowship 2013
University of Michigan

Exemplary Summer Research Citation University of Michigan 2012
University of Michigan

Undergraduate Best Student Paper Competition 2012
Earthquake Engineering Research Institute (EERI)

First Place Overall American Society of Civil Engineering (ASCE) 2012
Southeast Student Conference Competition

ExxonMobil LOFT Fellowship Program 2012
ExxonMobil Company

Department of Energy Research Scholarship 2011, 2012
University of Puerto Rico

Boeing Company Scholarship 2011
University of Puerto Rico

NSF-Louis Stokes Alliances for Minority Participation (PR-LSAMP) 2011
Mentored Undergraduate Research Experience Program

Scholarship for Outstanding Academic Record 2008-2013
University of Puerto Rico

RESEARCH & TECHNOLOGY DEVELOPMENT FUNDING

1. Smart Risers and Pipeline Systems, PI-Mesa, Chevron Research and Technology Development (R&TD), 06/2021-12/2023.

2. DigiPipeline (Subsea Pipeline Automation Design Platform), Co-PM-Mesa, Chevron (R&TD) and Surface Digital Platform, 11/2020-12/22.

TEACHING

1. *Anaconda Learning* - Data Science Portfolio Workshop: This live online course is designed to prepare data scientists to stand out when applying for their first data science role. We will cover portfolio development best practices to demonstrate you have the right skills and experience and explain how to present yourself and your achievements (LinkedIn, certifications, personal site) so that hiring managers and recruiters will notice you. We will also explore how to use the Anaconda notebooks and data catalog to quick-start your data science project and find useful data sets.

Instructed Courses at the University of Michigan

Course #	*Course Title*	*Teaching Role*	*Term*	*Enrollment/ Response*	*Q1*	*Q2*	*Q4*
NA 270	*Marine Design*	*Instructor*	*Winter 2018*	*10/11*	*3.90*	*4.10*	*3.90*
NA 270	*Marine Design*	*Co-Instructor*	*Fall 2017*	*33/39*	*3.62*	*4.03*	*4.87*
NA 423	*Intro to Num Hydro*	*Guest Lecture*	*Winter 2017*	-	-	-	-
NA 423	*Intro to Num Hydro Lab*	*Lab GSI*	*Winter 2017*	-	-	-	-

Evaluations - Q1: Overall, this was an excellent course; Q2: Overall, the instructor was an excellent teacher; Q4: I had a strong desire to take this course. Evaluations are on a 5-point scale where 5 is Strongly Agree, and 1 is Strongly Disagree.

GRADUATE COMMITTEE ACTIVITY

Master's Thesis

1. Kyle Porter, April 2023, “Investigation Of Two-Phase Flow-Induced Vibrations In Horizontal Gas-Liquid Flow", Committee Member (Current position: Occidental Petroleum Company)

PUBLICATIONS AND TECHNICAL REPORTS

Journal Articles

1. Kyle Porter, Eduardo Pereyra, Jose Mesa, Cem Sarica (2023) “Experimental Investigation of Induced Vibrations in Horizontal Gas-Liquid Flow". Journal of Experimental Thermal and Fluid Science.

2. Jose D. Mesa, Kevin J. Maki, Matthew T. Graham (2022) “Numerical Analysis of the Impact of an Inclined Plate with Water at High Horizontal Velocity". Journal of Fluid and Structures.

3. Jose D. Mesa, Kevin J. Maki (2018) “Hydroelastic Assessment of Different High-Speed-Vessel Stiffened Panel Designs". Naval Engineers Journal, September 2018, No 130-3, pp 33-42
Nominated as one of the top papers from ASNE's TSS 2018 conference.

Conference or Symposium Proceedings Papers

1. Jose D. Mesa, Gustavo Carvalho, Umair Hassan and Eduardo Pereyra (2025) “Data-driven Approach to Develop a Multiphase Meter From the Flow Induced Vibration in Subsea Jumpers" 11th International Conference on Computational Methods in Marine Engineering MARINE 2025, Edinburgh, Scotland

2. Esteban L Castro-Feliciano, Jose Mesa, John C Daidola (2024) “Planning Boat Hull Roughness and Influence on Performance, Fleet Economics and Environmental Impact” SNAME Chesapeake Power Boat Symposium Virginia, USA

3. Jose D. Mesa, Kyle Porter and Eduardo Pereyra (2023) “Computer Vision Approach for Pipeline Slug Flow Analysis" 10th International Conference on Computational Methods in Marine Engineering MARINE 2023, Madrid, Spain

4. Kyle Porter, Jose D. Mesa and Eduardo Pereyra (2022) “Fluid-Pipe Interaction in Horizontal Gas-Liquid Flow" Society of Petroleum Engineers Annual Technical Conference and Exhibition (SPE-ATCE 2022), Houston, USA

5. Jose D. Mesa, Haijing Gao and Yiannis Constantinides (2022) “Prediction and Benchmark of a Nearly Horizontal Flowline Slug Flow" ASME 41st International Conference on Ocean, O shore and Arctic Engineering (OMAE 2022), Hamburg, Germany.

6. Jose D. Mesa and Markku Santala (2020) “Gulf of Mexico Hurricane Single Event Fatigue Method for Riser Analysis" ASME 39th International Conference on Ocean, Offshore and Arctic Engineering (OMAE 2020), Fort Lauderdale, FL

7. Jose D. Mesa, Kevin J. Maki (2019) “Fluid-structure interaction analysis of high-speed water entry of curved bodies". Technology, Systems & Ships Conference 2019, Arlington, VA.
Nominated as one of the top papers from ASNE's TSS 2019 conference

8. Jose D. Mesa and Kevin J. Maki (2019) “Numerical Hydrodynamic Study on the Effects of Body Curvature During Ditching" VIII International Conference on Computational Methods in Marine Engineering MARINE 2019, Gothenburg, Sweden

9. Jose D. Mesa, Kevin J. Maki. “Numerical Investigation of Rectangular Flat Plate Slamming". 6th European Conference on Computational Mechanics (ECCM 6) 7th European Conference on Computational Fluid Dynamics (ECFD 7), Glasgow, UK, June 11th-15th 2018

10. Jose D. Mesa, Kevin J. Maki. “Numerical hydroelastic analysis of slamming for high-speed vessels”. In Proceedings of the 14th International Conference on Fast Sea Transportation, Nantes, France, September 27th-29th 2017

11. Kevin J. Maki, Matthew Graham, Jose Mesa. A FLUID-STRUCTURE INTERACTION ALGORITHM FOR SHIP HYDROELASTICITY. In Proceedings of the 11th OpenFOAM Workshop 2016 Conference. Paper #130, Guimaraes, Portugal, June 26th-30th, 2016

12. Margaret Craig, Dominic Piro, Lauren Schambach, Jose Mesa, Dave Kring, Kevin Maki. “A Comparison of Fully-Coupled Hydroelastic Simulation Methods to Predict Slam-Induced Whipping”. In the Proceedings of the 7th International Conference on Hydroelasticity in Marine Technology Split, Croatia, September 16th-19th 2015

13. Jose Mesa. “Seismic Sloshing Response of Above Ground Oil Storage Tanks”. In the Proceedings of the 65th Earthquake Engineering Research Institute Conference. 2012 Undergraduate Student Paper Award, Washington, USA, February 12th-15th 2013

INVITED PRESENTATIONS INTEREST
(Invited keynote presentations at conferences or symposia or seminar series at peer institutions)

"Fluid-Structure Interaction of Thin Wall Tanks Under Seismic Loading", University of Puerto Rico at Mayaguez: Earthquake Engineering Research Institute, Civil Engineering Department September 29, 2016

"Computational Fluid Dynamics for Wave-Interaction and Seakeeping Modeling", University of Puerto Rico at Mayaguez: Coastal & Marine Engineering Technology Seminar Class September 28, 2015

PROFESSIONAL SERVICE & TECHNICAL LEADERSHIP (SELECTED)

- **Member**, Tulsa University Fluid Flow Project (TUFFP)
  Industry–University Research Consortium (2021–Present)

- **Advisory Board Member**, Mechanical Engineering Department
  University of Puerto Rico at Mayagüez (Chevron-sponsored) (2021–2022)

- **Technical Paper Reviewer**, ASME Ocean, Offshore & Arctic Engineering Conference (OMAE) (2019)

- **Technical Abstract Reviewer**, ASNE Technology Systems and Ships Symposium (TSS) (2019)

- **Session Moderator**, ASNE Technology Systems and Ships Symposium (TSS)
  • USCG Structures Session (2019)
  • Technical Track 4 (2018)

- **Co-Chair**, University of Michigan Engineering Graduate Symposium (2017)

- **Invited Speaker & Recruitment Lead**, University of Michigan – University of Puerto Rico at Mayagüez Transportation, Coastal, and Marine Engineering Programs (2014–2016)