Khadija Ouajjani, PhD, MSc, MEng

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PROFILE

- Researcher, engineer, Fulbrighter and creative with 10+ years of international experience in structures FE simulation, crashworthiness, and additive manufacturing
- Skilled in working with diverse, geographically dispersed, and virtual teams across disciplines
- Experienced in both academic and industrial environments, with a hybrid background spanning aircraft structural simulation, materials research, machine learning application in data-driven engineering
- Proven ability to conduct interdisciplinary research, develop simulation methodologies, and design educational frameworks that connect theory with real-world engineering practice

RESEARCH INTERESTS

- **Primary:** Aircraft Structures; Structural & Computational Mechanics; Crashworthiness; Multiscale Modeling; AI & ML applications in engineering
- **Data & Process:** Data-Driven Material Characterization; Physics-Informed Machine Learning; Additive Manufacturing; Process-Structure-Property Relationships.

EDUCATION

Wichita State University, Wichita, KS, USA 08/2018 – 12/2024
Ph.D., Aerospace Engineering *GPA: 3.8*

- Major: Solid Mechanics and Structures. Minors: Aerodynamics; Quantum Mechanics
- Advisor: James E. Steck; Co-Advisor / Industry Mentor: Gerardo Olivares
- Dissertation: Leveraging Machine Learning in Porosity Prediction: A Case of Fused Deposition Modeling
- Industry Fellowship at NIAR, R&D activities in aircraft crashworthiness and certification by analysis (2018–2024)
- Preliminary research on innovative undergraduate STEM teaching methodologies to expedite and enhance job readiness in the aerospace industry

Wichita State University, Wichita, KS, USA 08/2016 – 05/2018
M.Sc., Aerospace Engineering *GPA: 3.9*

- Major: Solid Mechanics and Aircraft Structures
- Thesis: Numerical Representative Volume Element on the Mesoscale for FDM Parts Reinforced with Short Fibers

ENSEM, Casablanca, Morocco 09/2009 – 07/2012
MEng, Mechanical Engineering *Grade: 15/20*

- Major: Solid and Structural Mechanics
- Final Project: Development of a crimping machine from conceptual design to manufacturing validation

Moulay Driss CPGE, Fez, Morocco 09/2007 – 06/2009
Associate Certificate, Maths and Physics *Pass*

- Major: Theoretical mathematics ; Theoretical physics
- Completed a rigorous two-year program (Classes Préparatoires aux Grandes Écoles) focused on advanced mathematics, physics, and engineering sciences.

PUBLICATIONS

- 2025: "*Leveraging Machine Learning for Porosity Prediction in AM using FDM for Pretrained Models and Process Development*", 1st author, peer-reviewed and open access on Materials.
- 2022: "*A Mesoscopic RVE for Parts Manufactured through Fused Deposition Modeling and Reinforced with Short Fibers*", 1st author, preprint on Research Gate.

CONFERENCES

- K. Ouajjani, J. Steck, G. Olivares. "*Leveraging Machine Learning for Porosity Prediction in AM using FDM for Pretrained Models and Process Development*", presented at ASTM ICAM 2025, Las Vegas, NV, USA. October 06–10, 2025.
- K. Ouajjani, N. Smith: "*A Mesoscopic RVE for Parts Manufactured through Fused Deposition Modeling and Reinforced with Short Fibers*", presented at MMM10, Baltimore, MD, USA. October 02–07, 2022.

ACADEMIC SERVICE

- Manuscript Reviewer, *Journal of Modelling and Simulation in Materials Science and Engineering; Materials Research Express*, 2025 – Present
- Book Reviewer, *Fulbright Chronicles*, 2025 – Present

FUNDING & FELLOWSHIPS

- **Computational Mechanics Lab Fellowship**, National Institute for Aviation Research, 2018 – 2024
- **Research Fellowship Student Travel**, Graduate School, Wichita State University, 2022
- **International Student Scholarship**, Students Association, Wichita State University, 2021
- **Graduate Research Assistantship**, National Institute for Aviation Research, 2017 – 2018
- **Fulbright Fellowship**, Wichita State University, 2016 – 2018

TEACHING EXPERIENCE

Wichita State University, Wichita, KS

- Graduate Teaching Assistant, 01/2018 – 05/2022
  - AE737 Mechanics of Damage Tolerance (Graduate): Led substitute lectures and office hours

- AE333 Mechanics of Materials (Undergraduate): Led substitute lectures and office hours
- AE625 Finite Element Structural Analysis (Undergraduate): Teaching, grading, office hours

NIAR – Materials Research Group, Wichita, KS

- Graduate Research Assistant, 09/2017 – 05/2018
  - Supervised and trained undergraduate student assistants in NIAR practices for materials research and LS-Dyna based simulations

ENSEM, Morocco

- Tutor, 09/2010 – 07/2011
  - Advanced Mathematics and Physics: Tutoring and problem sets sessions

PROFESSIONAL EXPERIENCE

AVET-NIAR, Wichita, KS, USA 12/2024 – 11/2025
Postdoctoral Scientist

- Support testing and simulation efforts in conducting R&D contracted projects from federal agencies and private industry, centered on crash analysis and simulation methodologies.
- Investigate scientific findings, emerging trends, and novel simulation techniques, contributing to the development of more efficient simulations.
- Write proposals for federal grants towards drone testing and structural improvement
- Build packages (models + reports) for modeling strategies, and provide expert recommendations on simulation scenarios and testing plans to align with projects' objectives (Postmortem data extraction and skeleton modeling, aircraft sealant analysis, fatigue analysis LS-Dyna package, aircraft seat components modelling and analysis)
- Author comprehensive documentation to promote knowledge sharing and compliance with security standards, supporting sustained industry best practices.

National Institute for Aviation Research, Wichita, KS 08/2018 – 11/2024
PhD Researcher

- Develop internal tools to automate raw data reduction process for commonly contracted materials in characterization projects.
- Develop and validate high-fidelity FEA models consisting of 1M+ elements using LS-DYNA on High-Performance Computing (HPC) clusters
- Support drones related projects through optimization efforts, using DoE and CAD work, with a focus on 3D printing plastics and polymer structures
- Support PBF related projects in documentation, powder characterization and test matrix
- Develop and document static/dynamic structural models of aircraft components simulations for crashworthiness and certification projects
- Ensure consistency between all structure tests and support the certification process along FAA guidelines
- Coordinate with manufacturing teams and workshop staff to establish optimized testing environments and ensure precise specimen extraction, facilitating accurate and actionable testing outcomes.

- Establish material library from peer-reviewed research and literature review

National Institute for Aviation Research, Wichita, KS 09/2017 – 05/2018
Graduate Research Assistant within the Material R&D group

- Develop stable LS-Dyna material cards of aerospace grade materials (composites, polymers, alloys) for contracted crash analysis (fuselage drop, crash sled test, accident reconstruction).
- Conduct material testing on MTS machine using DIC technology to extract raw data
- Extract material properties from raw data
- Conduct single element, coupon and validation simulations to troubleshoot and confirm validity of material cards
- Document procedure for every project and ensure proper archiving for knowledge transfer
- Write reports pertaining to testing and simulation for clients
- Train undergraduate students on material characterization and testing procedures

Safran Group, Casablanca, Morocco 03/2014 – 07/2016
Aeronautics Design and Analysis Engineer

- Performed comprehensive Finite Element Analysis (FEA) studies, including static, dynamic, crash, impact, noise and vibration, failure, and overspeed analyses, to ensure the structural integrity and performance of Safran jet engine components.
- Conducted advanced crack propagation and lifecycle analyses for jet engine blades, informing critical decisions on part reliability and long-term operational safety.
- Advised on part recall strategies and maintenance solutions, including palliative maintenance, refurbishing, and termination strategies, enhancing fleet sustainability and cost-effectiveness.
- Designed and executed tailored analytical assessments and numerical simulations for aero structures and components, aligning with specific project objectives and desired data outputs.
- Investigated and resolved non-conformities in manufactured parts with derogations, ensuring compliance with safety and performance standards.
- Led the migration of digital models from Patran/Nastran/Samcef to Ansys, streamlining workflows and improving simulation capabilities for Safran jet engine projects.
- Authored and delivered certification reports and technical presentations on jet engine components in three languages, supporting regulatory approvals and cross-border collaboration.
- Coordinated simulation analysis and R&D efforts across multidisciplinary, multilingual, and geographically dispersed teams, driving innovation and maintaining project alignment.
- Trained interns and new recruits on technical practices, reporting methodologies, and archiving standards, fostering knowledge transfer and skill development.
- Traveled to France and Germany to acquire specialized expertise, apply it to local projects, and train colleagues at headquarters, ensuring global knowledge integration and consistency

NTS Maghreb, Rabat, Morocco 03/2013 – 02/2014
Mechanical Design Engineer

- Model different automotive components for crash analysis and Noise & Vibration tests

- Follow Japanese, French, Italian and Canadian clients' best practices, and provide avenues for improvement and automation.
- Implement digital project management through PLM technologies of Dassault Systèmes
- Support the launch of the Moroccan division of the NTS team, and train new recruits.
- Create tutorials and provide training and support on CATIA and ANSA.
- Travel to Canada to gain expertise, put it to practice and lead projects at HQ.

Aditya Auto Products & Engineering, Bangalore, India 07/2012 – 02/2013
Project Engineer Trainee

- Assist the project manager in the design, production and quality check processes of door latches.
- Design basic mechanical systems to check the conformity of door latches parts.
- Design a new door latch opening system and managed the production and trials of the prototypes.
- Design 2D draft plans for customers.
- Work with the quality department to create an archive for their gearboxes draft plans.

PROFESSIONAL SKILLS

CAD/FEA Packages: CATIA V5, ANSYS, ANSA, ABAQUS, COMSOL, Primer, Patran, Nastran, Matlab

Solvers: Samcef, LS-DYNA, Abaqus, Nastran

Programming / Software: Matlab, Python (Pandas, NumPy, TensorFlow, Keras, OpenCV, SQLAlchemy), Conda, pip, VS Code, Spyder, Git/GitHub, GPU computing

Quantum Computing: Qubit algorithms, IBM Quantum Gate Computer, Topological Quantum Computer (Microsoft)

Artificial Intelligence: Research, theory, and application

Certifications: Quantum Computing, Qubit by Qubit, 2020–2021; Dassault Systèmes PLM Enovia, 2013; ESL Full Accreditation, 2024

Languages: Arabic (native); French (fluent); English (fluent); German (B1); Spanish (A2)

COMMUNITY SERVICE

International Rescue Committee 08/2019 – 01/2025
Volunteer, ESL Instructor, Housing Setup Lead, Family Mentor and Facilitator

Wichita Family Crisis Center 08/2019 – 03/2025
Survivor Advocate, Volunteer

Beauties & Beasts Rescue 10/2021 – 11/2025
Volunteer

Big Brothers Big Sisters 01/2020 – 05/2022
Big Sister

Fulbrighter Network 05/2018 – ongoing
Coordinator

Fulbridge 2019 – ongoing
Regional Representative

Kansas Humane Society 01/2017 – 09/2018
Foster and Volunteer