Parameshwaran Pasupathy

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Summary

Doctoral researcher in the Department of Mechanical Engineering at Rutgers University - New Brunswick. Possess over ten years of experience in computational solid mechanics. Passionate about computational mechanics and physics.

Education

- **Rutgers University** — New Brunswick, NJ
  Doctorate in Mechanical and Aerospace Engineering ; GPA: 3.96 — *Sep. 2019 – Aug. 2024*
- **University of Michigan** — Ann Arbor, MI
  Master's in Aerospace Engineering; GPA: 3.51 — *Jan. 2012 - Dec. 2013*
  - **Research**: Model Order Reduction using Proper Orthogonal Decomposition (POD) for modeling of Heat conduction equation with source terms. POD based modeling of evolution of Orientation Distribution Function (ODF) equation for deformation of HCP polycrystalline microstructure under slip.
- **B.M.S College of Engineering (B.M.S.C.E)** — Bangalore, India
  Bachelor's Degree in Mechanical Engineering; With Honors - First Class — *Sep. 2004 - May. 2008*

Skills

- **FEM Software**: Abaqus FEA, MSC Nastran, ANSA, META POST, MSC Patran, Altair Hypermesh, LAMMPS
- **Programming Languages**: Python, FORTRAN, Matlab.
- **Optimization**: HEEDS MDO, modeFRONTIER, Python Scipy.
- **Machine Learning**: Neural Networks, Convolution Neural Networks (CNN), Recurrent Neural Networks, Scikit-Learn, TensorFlow

Experience

- **Rutgers University - Department of Mechanical and Aerospace Engineering** — New Brunswick, NJ
  Graduate Research Assistant and Raisler Fellow — *Sep 2019 – Current*
  - Doctoral research in developing multiscale computational models of the mechanics associated with traumatic injury to the central nervous system brain white matter (BWM). Developed a fractional viscoelastic constitutive material model of the microstructure of BWM under dynamic loads via a FORTRAN user material subroutine and Abaqus finite element (FEA) solver and high performance computing.
  - Developing a microstructural model of brain white matter that incorporates a hyperelastic damage mechanism that predicts the softening of tissue under repeated loads using FORTRAN subroutines and Abaqus.
  - Developing hybrid deep-learning models by combining FEA simulations of brain tissue with CNN algorithm.

  Graduate Teaching Assistant — *Jan 2022 – June 2022*
  - Engineering Mechanics - Dynamics and Introduction to Mechatronics: Assist professor in teaching classes, organize lectures, mentor students and grade exams.

  Summer Session Instructor — *June 2021 – July 2021, July 2022 – August 2022*
  - Taught and mentored sophomore students in Mechanics of Materials, Engineering Mechanics: Statics. Developed course materials, assignments and exams for the course.

- **CAREERS Cyberteam - Yale Center for Research Computing** — New Brunswick, NJ
  Student Research Computing Facilitator — *June 2022 - Feb. 2023*
  - Streamlining the workflow of optimization of one-dimensional porous polymers for chemical motifs such as pore size and internal surface area using molecular dynamics simulations.
  - Automate simulation workflow which combines several steps such as density functional theory calculations and molecular dynamics simulations via scripts and high performance computing.

- **Siemens PLM Software – HEEDS Design Space Exploration Team** — East Lansing, MI
  Sr. Technical Engineer — *Oct. 2018 – Aug. 2019*
  - Lead the HEEDS introductory training sessions for design space exploration studies. Conduct user specific trainings for integration of FE tools such as Abaqus, Simcenter-3D, ANSA, METAPOST and Nastran with HEEDS for design space exploration studies.
  - Provide technical and sales support for HEEDS optimization software suite, including demonstrations, development of process integration, product testing.

- Developed a parametric optimization model for a thermoplastic automotive sealing system with preferred stiffness characteristics. Solution achieved by parametrizing geometric variables and by seamless integration of non-linear FE simulations in Abaqus with HEEDS MDO using python.

- **BETA CAE Systems USA, Inc** Greater Detroit, MI
  Senior Engineer *Mar. 2014 – Oct. 2018*
  - Automated the conversion of Static Over Check (SOC) door trim simulations from Abaqus format to a ready-to-run Dynamic Over Check (DOC) Models for analysis using LS-DYNA.
  - Developed a suite of automation tools for complete FE model set-up and post-processing of Oil Canning and Denting analysis of sheet metal panels using python in ANSA preprocessor and MetaPost postprocessor.
  - Design and optimization of Knuckle joints used in suspension systems under static load-cases using Abaqus solver and Tosca – Topology optimization.
  - Developed a python based tool that creates a FE model representations of weather-strip seals for nonlinear static analysis of automotive door frames in Abaqus Solver. The tool reduced the time taken for modeling door seals from 1 hour to less than 2 minutes.
  - Set up and perform modal, static analyses for sub vehicle assemblies using Nastran and perform time explicit analysis for dynamic load cases (such as door slam) using Abaqus Explicit.
  - Travel to customer locations, both national and international, to conduct Durability based training and scripting training in Python for ANSA and MetaPost. Provide ANSA, Abaqus related support.

- **University of Michigan - National Nanotechnology Infrastructure Network** Ann Arbor, MI
  Graduate Research Assistant *May 2012 – Dec. 2013*
  - Developed Numerical Simulations for a Hanging Pendant Drop using the Two-Phase Flow Level Set Method (Implementation using COMSOL Multiphysics).
  - Developed a Reduced Order model from a Finite Element Approximation of MEMS Based Gyroscope (Reduced Matrices generated using a FEM Model in COMSOL Multiphysics coupled with Matlab).
  - Studied the effect of surface roughness on the natural frequency of cantilever beams for MEMS based applications.

- **B.M.S College of Engineering - Department of Mechanical Engineering** Bangalore, India
  Adjunct Faculty and Research Assistant *Feb. 2011 – Dec. 2011*
  - Taught Undergraduate Subjects in Mechanical Engineering which include: Machine Drawing, Engineering Drawing, Turbomachinery Laboratory, Finite Element Modeling in ANSYS, Foundry and Forging Laboratory.
  - Investigated the strength of bolted composite joints by introducing various metallic inserts using FEA. The project involved the simulation of bolt loads on a composite plate by various methods and studying the effect of introduction of metallic bush at the hole (Simulations performed using Abaqus).

- **TATA Consultancy Services, Bangalore - Engineering and Industrial Services** Bangalore, India
  Aerospace Structural Analysis Engineer *Sep. 2008 – Dec. 2010*
  - Performed structural analysis on various primary and secondary aircraft structures. The nature of analyses includes:
    Static analysis for pressure loads and Constant Acceleration loads.
    Dynamic analysis: Modal analysis, Frequency Response analysis, Transient Response analysis.
    Buckling and Fatigue analysis using Finite Element Method.
  - Hand calculations using classical engineering mechanics approach for fatigue analysis, determination of stress concentration factors and margins for safety.

Publications

- Pasupathy, P., Georgiadis, J. G. & Pelegri, A. A. (2022). A Fractional Viscoelastic Model of the Axon in Brain White Matter. 11th International Conference on Mathematical Modeling in Physical Sciences. arXiv preprint arXiv:2304.06257
- Agarwal, M., Pasupathy, P., & Pelegri, A. A. (2022). Oligodendrocyte tethering effect on hyperelastic 3D response of axons in white matter. Journal of the Mechanical Behavior of Biomedical Materials, 134, 105394.
- Agarwal, M., Pasupathy, P., De Simone, R., & Pelegri, A. A. (2021, November). Oligodendrocyte Tethering Effect on Hyperelastic 3D Response of Injured Axons in Brain White Matter. In ASME International Mechanical Engineering Congress and Exposition (Vol. 85598, p. V005T05A050). American Society of Mechanical Engineers.
- Pasupathy, P., De Simone, R., & Pelegri, A. A. (2020, November). Numerical Simulation of Stress States in White Matter via a Continuum Model of 3D Axons Tethered to Glia. In ASME International Mechanical Engineering Congress and Exposition (Vol. 84522, p. V005T05A038). American Society of Mechanical Engineers.