

SAGAR BHATT

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EDUCATION

- **Rensselaer Polytechnic Institute** Troy, NY
Doctor of Philosophy in Mechanical Engineering Dec 2021 (Expected)
- **University at Buffalo, State University of New York** Buffalo, NY
Master of Science in Mechanical Engineering Feb 2017
- **Vellore Institute of Technology** Vellore, India
Bachelor of Technology in Mechanical Engineering May 2014

PROJECTS

- **Adaptive Control of microstructure evolution:** Since Aug 2017
 - Using Monte-Carlo method and Finite Element Crystal Plasticity to simulate microstructure evolution of Ti-6Al-4V alloy under thermo-mechanical loading.
 - Successfully simulated grain growth in Ti-6Al-4V microstructure above β -transus temperature.
 - Currently working on calibrating Monte-Carlo model to simulate microstructure evolution under β -transus temperature and a deformation model for mechanical loading.
- **Finite Element Modeling of Columnar Grained Nickel Microstructure Deformation near Triple Junctions:** May 2020
 - Used Finite Element Crystal Plasticity to simulate 2% tensile strain on a columnar grained Nickel microstructure.
 - Accurately predicted slip activity and deformation fields at the triple junctions which were compared to the experimental observations.
 - Currently in the process of submission for publication.
- **Hybrid Potts-Phase field model to simulate microstructure evolution:** May 2018
 - Implemented a hybrid Monte-Carlo (Potts)-Phase field model to simulate coupled grain growth and phase change in a microstructure.
 - Produced comparable results to published studies on similar work and performed scalability study on the parallel code achieving speed up of 92X at 72% strong scaling efficiency for 8.2K MPI ranks.
- **Optimization of Temperature Profile of billet in Extrusion Process:** Dec 2017
 - Formulated a optimization problem to compute an initial temperature profile for a billet that will result in uniform grain size after extrusion.
 - Implemented it using Matlab's optimization toolbox coupled it with a parallel Monte-Carlo grain growth framework.
 - Final microstructure resulted in a 77.5% reduction in standard deviation of the grain size after optimization.
- **Particulate Matter measurement of a two-stage boiler:** Aug 2016
 - Designed, fabricated apparatus and carried out experiments to extract particulate matter from the flue gas of a two-stage wood fired boiler.
 - Developed a methodology to correctly estimate the mass of PM 2.5 particles in the collected residue, taking into account moisture and adsorption of water on carbon particles.
- **Solution to Laplace equation using preconditioned conjugate gradient method with compressed row storage and MPI:** Dec 2016
 - Implemented a Conjugate Gradient Krylov solver that uses Jacobi preconditioning to solve Laplace equation.
 - Used Compressed row storage and its matrix-vector product computational kernel to store and operate on large sparse matrices, reducing the memory required by the large matrices from 7.2 Terabytes to 60.7 Megabytes.
 - Decomposed the domain and matrix storage into well-balanced chunks and performed scalability study showing speedup of 115X and scaling efficiency of 87% on 132 processes.
- **Finite Element code for simulating deformation in an isotropic elastostatic body:** Dec 2016
 - Developed 3D FE code using Matlab for 8-node hexahedron elements and in 2D for Constant Strain Triangle, 4-noded and 8-noded Quadrilateral elements.
 - Performed convergence study based on the energy norm and compared the results with ABAQUS for a rectangular beam and I-beam with maximum displacement within 1% of those predicted by ABAQUS.
- **Simulation of steady, laminar flow over a backward-facing step:** May 2016
 - Developed a Navier-Stokes solver using a three-point, second order finite differencing scheme to discretize the convective and viscous fluxes in conjunction with scalar, fourth-difference, third-order artificial dissipation for stability.
 - Implemented dual time-stepping with a second-order backward scheme in time and four stage Runge-Kutta time stepping for pseudo time. Demonstrated reasonable agreement with experimental and computational resultss from literature.

SKILLS

- **Programming:** C++, C, Matlab, Python, MPI, Open MP, Bash Scripting, Julia
- **Softwares:** Simmetrix, ANSYS, Abaqus, Siemens NX, SolidWorks, CATIA, Pro E, Autodesk Fusion 360/Inventor, AutoCAD
- **Miscellaneous:** Git, Prview, L^AT_EX, Microsoft Office Suite

PUBLICATIONS

- **S. Bhatt**, A. Baskaran, D. Lewis, and A. Maniatty. Numerical modeling of ti-6al-4v microstructure evolution for thermomechanical process control. In *Proceedings of NUMIFORM 2019: The 13th International Conference on Numerical Methods in Industrial Forming Processes*, 2019

PRESENTATIONS AND POSTERS

- **S. Bhatt** and A. Maniatty. Numerical modeling of columnar grained nickel microstructure deformation near triple junctions. CMDIS Annual Research Symposium, Center for Materials, Devices, and Integrated Systems, Rensselaer Polytechnic Institute, 2019
- M. Allahua, A. Baskaran, **S. Bhatt**, G. Kane, A. Kekre, , D. Hull R. Lewis, A. Maniatty, and J. Wen. *Poster:* adaptive control of ti-6al-4v evolution during thermomechanical processing. CMDIS Annual Research Symposium, Center for Materials, Devices, and Integrated Systems, Rensselaer Polytechnic Institute, 2019
- **S. Bhatt**, A. Baskaran, D. Lewis, and A. Maniatty. Numerical modeling of ti-6al-4v microstructure evolution for thermomechanical process control. NUMIFORM 2019: The 13th International Conference on Numerical Methods in Industrial Forming Processes, 2019
- **S. Bhatt** and A. Maniatty. Numerical modeling of ti-6al-4v microstructure evolution for thermomechanical process control. SCOREC CSE Seminar Series, Rensselaer Polytechnic Institute, 2019
- A. Kekre, A. Baskaran, **S. Bhatt**, G. Kane, M. Allahua, D. Lewis, A. Maniatty, J. Wen, and Hull R. *Poster:* towards integrating multiscale modeling methods with adaptive control of ti-6al-4v microstructure during thermomechanical processing. New York Manufacturing Conference 2019, Center for Automation Technologies and Systems, Rensselaer Polytechnic Institute, 2019
- A. Baskaran, **S. Bhatt**, G. Kane, M. Allahua, Z. Huang, D. Lewis, A. Maniatty, J. Wen, and Hull R. *Poster:* adaptive control of ti-6al-4v using adaptive microscale simulator techniques. CMDIS Annual Research Symposium, Center for Materials, Devices, and Integrated Systems, Rensselaer Polytechnic Institute, 2018
- **S. Bhatt**. Physical system modeling and simulation using hpc. CMDIS Annual Research Symposium, Center for Materials, Devices, and Integrated Systems, Rensselaer Polytechnic Institute, 2017

AWARDS

- **NSF Travel Grant for Early Career US-based Researchers:** Among selected number of people awarded this grant which covered the costs associated with attending the NUMIFORM 2019 conference. *May 2019*

EXPERIENCE

- **Rensselaer Polytechnic Institute** Troy, NY
Research and Teaching Assistant *Aug 2017 - Present*
 - TA for courses Introduction to Engineering Design, Engineering Graphics & CAD and Engineering Dynamics.
 - Working as a RA in Prof. Antoinette M. Maniatty’s research group on simulating microstructure evolution under thermomechanical loading.
- **University at Buffalo, State University of New York** Buffalo, NY
Grader and Tutor *July 2016 - Dec 2016*
 - Grader for Thermodynamics class.
 - Tutored Math, Physics and Mechanical Engineering courses at the Academic resource center.

LEADERSHIP ROLES

- Reviewer and Session Chair, Graduate Research Symposium, *Rensselaer Polytechnic Institute* *May 2021*
 - Reviewer for submissions to the research symposium organized by graduate students at RPI.
 - Chair and Organizer of the networking event component of the symposium.
- Vice President, Graduate Council, *Rensselaer Polytechnic Institute* *May 2020 - March 2021*
 - Elected Vice President of the 15 person graduate student council representing 1366 graduate students at RPI.
 - Worked with the institute to address issues related to graduate academics, Teaching and Research Assistants, ensuring smooth transition to remote research.
 - Organized various online programs to address student issues ranging from Mental Health to public safety to international student concerns apart from the usual fun events.
- Representative, Graduate Council, *Rensselaer Polytechnic Institute* *May 2019 - May 2020*
 - Coordinated admissions activities with the Graduate School, Graduate Admissions office and International Student and Scholar Services.
 - Coordinated social functions for the Graduate Student Body.
- Graduate Council Representative, Executive Board, *Rensselaer Union* *May 2019 - May 2020*
 - Prepared and approved the budget for Fiscal Year 2020-21 of the Student Union.
 - Managed the business affairs, approved the hiring and continuance of all administrative personnel and determined the classifications of student clubs and organizations at the Rensselaer Union.
 - Represented 5 clubs in the E-Board.