Dehao Liu

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Education

Georgia Institute of Technology, Atlanta, Georgia, USA   *Aug. 2016-Present*
4th year PhD student in Mechanical Engineering
Doctor of Philosophy (PhD) in Mechanical Engineering (expected in Fall 2020)
- Concentration: Investigation of Process-Structure-Property Relationship in Additive Manufacturing Using Physics-based Modeling and Machine Learning Algorithms

Tsinghua University, Beijing, China   *Sep. 2012-Jul. 2016*
Bachelor of Engineering in Mechanical Engineering & Automation
- Concentration: Multiscale Modeling of Subtractive Manufacturing

Research Interests

My research interest is to investigate the Process-Structure-Property relationship during Selective Laser Melting (SLM) process using physics-based modelling and machine learning algorithms. My ultimate goal is to construct the process-structure-property relationship in additive manufacturing for optimization of process and design.

Work Experience

Product Simulation and Modeling, Siemens Corporate Technology, Princeton, NJ   *May 2019–Aug. 2019*
Graduate Intern, Mentor: Dr. Elena Arvanitis and Dr. Lucia Mirabella
- Generated surface profiles using conditional WGAN-GP

Fuels Modeling and Simulation, Idaho National Laboratory, Idaho Falls, ID   *Jun. 2018–Aug. 2018*
Graduate Intern, Mentor: Dr. Larry Aagesen
- Formulated and implemented anisotropic interface energy for a multi-phase multi-order parameter grand potential phase-field model in MOOSE

Sandvik Coromant Company, Beijing, China   *Dec. 2015–Jan. 2016*
Intern
- Designed a new micrometer scale (~µm) adjustable boring cutter using Solidworks and ANSYS

Research Experience

Multiscale System Engineering Lab, Georgia Institute of Technology, Atlanta, Georgia   *Jul. 2015–Present*
Research Assistant, Advisor: Prof. Yan Wang
- Investigated Process-Structure-Property relationship during Selective Laser Melting (SLM) process using physics-based modeling and machine learning algorithms
- Developed a multi-fidelity physics-constrained neural network (MF-PCNN) for materials design
- Conducted mesoscale multi-physics simulation of solidification in Selective Laser Melting (SLM) process using a Phase Field Method (PFM) and Thermal Lattice Boltzmann Method (TLBM)
- Implemented simulation of laser cladding at a micro scale using Kinetic Monte Carlo (KMC) method and Activation-Relaxation Technique

Institute of Mechatronic Engineering, Tsinghua University, Beijing, China   *Oct. 2013–Jan. 2014*
Research Assistant, Advisor: Prof. Chenglong Fu
- Designed a knee-joint and ankle joint for an active electrical transfemoral prosthesis

Computer Aided Manufacturing Lab, Tsinghua University, Beijing, China   *Sep. 2012 –Jul. 2016*
Research Assistant, Advisor: Prof. Yiming (Kevin) Rong, Prof. Gang Wang
- Conducted Molecular Dynamics (MD) simulation on formation mechanism of grain boundary steps in micro-cutting of polycrystalline copper
- Invented an in-situ infrared (IR) temperature-measurement method with back focusing on surface for creep-feed grinding

- Implemented modelling of the austenitizing process in hypoeutectoid Fe-C steels under a high heating rate to research the influence of the microstructure scale and heating rate on the transformation kinetics
- Completed creep-feed grinding experiments to study the effects of grinding parameters on surface temperature of workpiece
- Design of boiler automatic temperature acquisition and analysis system by using thermocouple, DAQ and LabVIEW

Academic Activities

- Presented at the ASME 2019 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference (IDETC/CIE 2019)   *Aug. 2019*
- Presented at the ASME 2017 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference (IDETC/CIE 2017)   *Aug. 2017*
- Presented at World Congress on Integrated Computational Materials Engineering (ICME 2017)   *May 2017*
- Attended ASME 2016 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference (IDETC/CIE 2016)   *Aug. 2016*
- Attended 2015 ASME Additive Manufacturing + 3D Printing Conference (AM3D)   *Aug. 2015*

Publications

1. Tran, A. V., Liu, D., Tran, H. A., & Wang, Y. (2019). Quantifying Uncertainty in the Process-Structure Relationship for Al-Cu Solidification. *Modelling and Simulation in Materials Science and Engineering*.
2. Liu, D., & Wang, Y. (2018). Mesoscale multi-physics simulation of rapid solidification of Ti-6Al-4V alloy. *Additive Manufacturing*.
3. Nie, Z., Wang, G., Liu, D., & Rong, Y. (2017). A statistical model of equivalent grinding heat source based on random distributed grains. *Journal of Manufacturing Science and Engineering*.
4. Liu, D., & Wang, Y. (2017, August). Mesoscale Multi-Physics Simulation of Solidification in Selective Laser Melting Process Using a Phase Field and Thermal Lattice Boltzmann Model. In *ASME 2017 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference* (pp. V001T02A027-V001T02A027). American Society of Mechanical Engineers.
5. Liu, D., Wang, G., Yu, J., & Rong, Y. K. (2017). Molecular dynamics simulation on formation mechanism of grain boundary steps in micro-cutting of polycrystalline copper. *Computational Materials Science*, *126*, 418-425
6. Liu, D., Wang, G., Nie, Z., & Rong, Y. K. (2016). An in-situ infrared temperature-measurement method with back focusing on surface for creep-feed grinding. *Measurement*, *94*, 645-652
7. Nie, Z., Wang, G., Yu, J., Liu, D., & Rong, Y. K. (2016). Phase-based constitutive modeling and experimental study for dynamic mechanical behavior of martensitic stainless steel under high strain rate in a thermal cycle. *Mechanics of Materials*, *101*, 160-169
8. Liu, D., Wang, G., Nie, Z., & Rong, Y. K. (2014, June). Numerical Simulation of the Austenitizing Process in Hypoeutectoid Fe-C Steels. In *ASME 2014 International Manufacturing Science and Engineering Conference collocated with the JSME 2014 International Conference on Materials and Processing and the 42nd North American Manufacturing Research Conference* (pp. V001T01A004-V001T01A004). American Society of Mechanical Engineers

Awards

- **National Endeavor Fellowship**, 10%   *2015*
- **Social Work Scholarship**, 10%   *2014*
- **Academic Excellence Scholarship**, 10%   *2013*

Skills

- **Materials:** SEM, Nano-indentation Hardness Test, Metallographic Observation, Phase Diagrams, Stress and Strain, Sample Preparation, Manufacturing Processes

- **Operating System & Programming Language:** Windows, Linux, C/C++, Fortran, Matlab, Python, OpenMP, GitHub
- **Software:** TensorFlow, PyTorch, LAMMPS, SPPARKS, MOOSE, OpenPhase, DAMASK, PRISMS-Plasticity, AutoCAD, Solidworks, CATIA, Creo, ANSYS, ABAQUS, MATLAB, COMSOL, LabVIEW, Arduino, Multisim, Origin, Microsoft Office, Photoshop, Endnote
- **Language:** Chinese (Native), English (Professional), Cantonese(Professional)
- **Communication:** Technical Presentations and Technical Reports