

Douglas P. Fankell

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Education

- **Ph.D.: Mechanical Engineering – Mechanics of Materials** (August 2017)
Dissertation – “*A thermo-poromechanics finite element model for predicting arterial tissue fusion*”
University of Colorado – Boulder
- **M.S.: Mechanical Engineering – Mechanics of Materials** (December 2015)
University of Colorado – Boulder
GPA – 3.94
- **M.S.: Civil Engineering – Structural Engineering, Mechanics of Materials** (May 2012)
University of California – Berkeley
GPA – 3.34
- **B.S.: Architectural Engineering – Structural Engineering** (May 2011)
University of Wyoming
GPA – 3.86

Teaching Experience

- **Assistant Professor of Practice** (Aug. 2020- Present)
Department of Mechanical Engineering, Colorado State University
 - Teach 6 undergraduate and/or graduate courses a year.
 - Develop new course methodology and refine instruction techniques.
 - Conduct research engineering education methodology.
 - General committee involvement.
 - Courses Experience: Intro to Mechanical Engineering, Mechanical Engineering Problem Solving, Dynamics of Machines, Advanced Dynamics, Finite Element Analysis.
- **Adjunct Professor, Graduate Design Program** (Aug. 2018- May 2020)
Department of Mechanical Engineering, University of Colorado-Boulder
 - Advise graduate design teams tasked with completing with a mechanical design project for a client.
 - Guest lecture for the class.
 - Evaluate the teams progress, deliverables, and provide final grades based on student and team performance.
- **Instructor, Graduate Design I and II** (Aug. 2016 – May 2017)
Department of Mechanical Engineering, University of Colorado – Boulder
 - Develop and present weekly lectures on subjects relevant to product design including project management, the design process, team collaboration, professionalism, etc.
 - Communicate with industry collaborators who sponsor design teams and their faculty mentors.
 - Organize the class into design teams, assign teams to industry projects.
 - Supervise team design projects on design, planning, prototyping and fabrication.
 - Grade students based on project reports and presentations.
 - Supervise 1 TA tasked with providing fabrication tools and aid to teams.

- Head Teaching Assistant, Undergraduate Mechanics of Solids (Aug. 2013 – May 2014)

Department of Mechanical Engineering, University of Colorado – Boulder

- Conducted twice-weekly recitation sections to provide supplemental information to lectures.
- Held twice-weekly office hours to aid students with homework in a one-on-one environment.
- Developed solutions for and graded homework and exams, recorded homework and exam scores, proctored exams.
- Supervised 2 TAs, including organizing grading, office hour and recitation schedules.
- Organized and presented lectures throughout the semester.
- Earned an *Outstanding Teaching Assistant Award*

- Supplemental Instructor, Undergraduate Statics and Dynamics (Jan. 2009 – May 2011)

University of Wyoming

- Conducted twice-weekly recitation sections to provide supplemental information to lectures.
- Held weekly office hours to aid students with homework in a one-on-one environment.
- Developed solutions for and graded homework and exams, recorded homework and exam scores, proctored exams.
- Aided in developing training protocol for future supplemental instructors.

Research and Design Experience

-Aerospace Stress Engineer and Task Manager (Launchers Division), RUAG Space. (Oct. 2019-Present), Centennial, CO

- Assign and manage tasks for an analysis team to support the development of the heat shield of United Launch Alliance's Vulcan rocket.
- Conduct advanced non-linear finite element analyses of rocket components experience extreme acoustic, thermal, and dynamic loading.
- Develop mechanical testing protocols and evaluate the applicability and mechanical performance of metallic and composite structures.

-Senior Engineer, Structural Integrity Associates Inc. (Jan. 2018- Oct. 2019)

Centennial, CO

- Develop innovative predictive computational analysis techniques to simulate the advanced physics of structural mechanics, fluid dynamics, and multi-physics engineering problems.
- Work as a lead technical engineer to conduct advanced analysis on structures subject to extreme loading (blast and seismic) in highly regulated industries (Nuclear/DOD).
- Manage highly technical advanced engineering projects.
- Conduct business development by attending conferences and speaking at them as technical expert.
- Mentor entry level engineers.

- Graduate Research Assistant, Advanced Medical Technologies Laboratory (Aug. 2013- Aug. 2017)

University of Colorado – Boulder

- Worked to develop and code a multi-phase, large deformation, thermo-poromechanics finite element model to model medical device – tissue interactions and inform device design.

- Researched the structural and thermal mechanics of soft tissue and implement non-linear, finite strain, anisotropic, hyperelastic, temperature dependent material and damage models into various finite element programs.
- Conducted and designed experiments to determine the mechanical properties of biological tissue under supraphysiological loading.
- Conducted research with a local area company on device design and production using predictive finite element models of direct heat arterial fusion.

- **Summer Computational Physics Fellow, Los Alamos National Lab** (Jun. 2016 – Aug. 2016)
Los Alamos, NM

- Worked with a teammate to implement a super-time-stepping algorithm to simulate the physics of detonation shock dynamics.

- **Graduate Design Project, CU M.E. Graduate Design Program** (Aug. 2014 – May 2015)
University of Colorado – Boulder, Boulder, CO

- Worked with a local area company on a team of 3 engineers to develop a dual-axis, continuous flow, planetary centrifuge for separating blood components.
- Conducted mathematical analysis on the mechanics and dynamics of a planetary system.
- Designed, analyzed and manufactured components of a centrifuge system experiencing speeds up to 5000 rpm and g-fields of 2000g.
- Researched and conducted analysis on the fluid dynamics of blood components under high g-fields including analysis of the Boycott effect.

- **Design Engineer, KL&A Inc.** (May 2012 – July 2013)
KL&A Inc. Loveland, CO

- Worked on a team of 5 engineers designing structural systems of multi-story office, multi-unit residential and industrial buildings.
- Applied mechanical knowledge to design and analyze structural systems consisting of steel, concrete, masonry and timber.
- Developed and coded analysis programs to be used in concert with commercially designed software.
- Became familiar with governmental safety regulations and ensured buildings met municipal standards.

Mentoring Experience

- **Discovery Learning Apprenticeship Mentor**, (Jan. 2016 – Aug. 2017)
Department of Mechanical Engineering, University of Colorado – Boulder

- Mentor two undergraduate research assistants in designing and developing a medical device to measure the water content of biological tissue.

Skills

- **Technical Skills**

- **Public Speaking**
- **Technical Writing:** Peer reviewed publication, proposal writing
- **Design and Fabrication:** Produce drawings and specifications, design and build experimental mechanical and electromechanical devices.
- **Laboratory Skills:** Design and conduct experiments to validate analysis and inform device design.

- Computing Skills

- **Analysis:** Nonlinear Finite Element Analysis (particularly of thermomechanical systems and non-linear materials), heat and mass transfer of multi-phase materials, mechanics of solids (finite strain, hyperelastic materials, poroelastic materials), fluid dynamics.
- **Programming:** Matlab, Fortran, C++, C, Python, Visual Basic
- **Software:** Solidworks, Abaqus, Ansys, Comsol, Revit, AutoCAD, Minitab, Latex, Linux OS, M.S. Office

Professional Organizations and Volunteer Work

- Professional Memberships

- **Member,** American Society of Mechanical Engineers (2013-Present)
- **Member,** International Society for Optics and Photonics (2014-2015)
- **Member,** Tau Beta Pi Engineering Honor Society (2009–Present)
- **Member,** American Society of Civil Engineers (2008-2013)
- **Member,** Engineering Mechanics Institute (2012-2013)
- **Officer,** Architectural Engineering Institute (2009-2011)

- Community and Volunteer

- **Volunteer Lecturer,** Broomfield High School, CO (2015-present)
- **Volunteer,** GEARS, (2014-2017)
- **Youth Basketball Coach,** Broomfield, CO (2013-2016)
- **Volunteer and Participant,** Denver CYAS (2013-Present)
- **Volunteer,** Habitat for Humanity (2008-2012)
- **Officer,** Revive Student Group (2009-2011)
- **Team Director for SEARCH retreat,** Revive Student Group (2008-2011)

Awards and Honors

- Thomas & Brenda Geers Graduate Fellowship (Sept. 2016)
- Los Alamos Computational Physics Workshop Fellowship (June 2016 – Aug. 2016)
- Dean’s Outstanding Merit Fellowship (Aug. 2013 – May 2014)
- Outstanding Mechanical Engineering Research Potential Fellowship (Aug. 2013 –May 2014)
- Kenneth Johnson Graduate Student Award (Dec. 2014)
- **Outstanding Teaching Assistant (May 2014)**
- Wyoming Peak Achievement Scholarship (Aug. 2007 – May 2011)
- Howard J. Leik Scholarship (2009)
- J.W. Van Dyke Scholarship (2008)
- President’s List (2007, 2010, 2011)
- Dean’s List (2008, 2009, 2010)
- Tau Beta Pi Outstanding Freshman

Scholarship

- Peer Reviewed Journal Publications

- **Fankell, D.P.,** Kramer, E.A., Cezo, J., Ferguson V.L., Taylor, K.D, Rentschler, M.E. “A novel parameter predicting arterial fusion and cutting in finite element models”, Annals of Biomedical Engineering, 2016

- Kramer, E.A., Cezo J., **Fankell, D.P.**, Ferguson V.L., Taylor, K.D, Rentschler, M.E. “*Energy-based vascular fusion relies on sustained tissue dehydration*”. Annals of Biomedical Engineering, 2016 **Editors Choice: Top Paper*
- **Fankell, D.P.**, Kramer, E.A., Ferguson V.L., Reguiero, R., Rentschler, M.E. “*A small deformation thermo-poromechanics finite element model and its application to arterial tissue fusion*”, ASME J. of Biomechanical Eng., 2017 **Republished as an editor’s choice paper in 2018.*
- **Fankell, D.P.**, Ferguson V.L., Reguiero, R., Rentschler, M.E. “*A large-deformation, partially saturated, thermo-poromechanics finite element model for biological tissue*”, Acta Biomaterial (In Preperation).

- Peer Reviewed Conference Publications

- **Fankell, D.P.**, Ferguson V.L., Taylor, K.D., Rentschler, M.E. “*A Novel Parameter for Predicting Arterial Fusion and Ablation in Finite Element Models,*” Proceedings of the SPIE - Progress in Biomedical Optics and Imaging, v 9326, p 93260C (8 pp.), 2015.

- Peer Reviewed Conference Presentations

- **Fankell, D.P.**, Walter, M. “Acoustic-Structural FEA Modeling of a Recirculation Outlet Rupture”, to be presented at ASME Piping and Pressure Vessel Conference, San Antonio, TX, 2019.
- **Fankell, D.P.**, Ferguson V.L., Taylor, K.D., Rentschler, M.E. “*A Novel Parameter for Predicting Arterial Fusion and Ablation in Finite Element Models,*” presented at SPIE Photonics West, San Francisco, CA. 2015.

- Peer Reviewed Conference Posters

- **Fankell, D.P.**, Ferguson V.L., Taylor, K.D., Rentschler, M.E. “*Impact of Heater Location and Ambient Conditions on Fusion Strength during Direct Heat Tissue Fusion,*” poster presentation at the 7th World Congress of Biomechanics, Boston, MA, 2014.

- Other Presentations

- **Fankell, D.P.**, “*Vibrations in Aerospace Applications*”, Presented to AIAA Club at Colorado State University, March 30, 2021.
 - **Fankell, D.P.**, Ferguson V.L., Reguiero R. Rentschler, M.E. “*Finite element modeling of thermal tissue fusion and cutting: a thermo-poromechanics approach*”, Presented to XCP members at Los Alamos National Laboratory, Los Alamos, NM, Aug. 18, 2016.
 - **Fankell, D.P.**, Ferguson V.L., Taylor, K.D., Rentschler, M.E. “*A Novel Parameter for Predicting Arterial Cutting in Finite Element Models*” 2015 Graduate Engineering Recruitment and Research Symposium, Boulder, CO, March 5, 2015.
 - **Fankell, D.P.**, Eisenach, A., Ortiz, N, “*A Continuous Flow Planetary Centrifuge*” Graduate Product Design Presentation to Terumo BTC. Lakewood, CO, May 5, 2015.
 - **Fankell, D.P.**, Ferguson V.L., Taylor, K.D., Rentschler, M.E. “*Impact of Heater Location on Direct Heat Arterial Fusion,*” 2014 Graduate Engineering Recruitment and Research Symposium, Boulder, CO, March 6, 2014.
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