

CURRICULUM VITAE – JAMES KOCH

PERSONAL INFORMATION	James Koch Seattle, Washington, USA ph. 513-305-7113 jvkoch@uw.edu in LinkedIn Google Scholar
EDUCATION	PhD, Aeronautics and Astronautics, University of Washington, Seattle. <i>Expected 2020.</i> M.S., Applied Mathematics, University of Washington, Seattle, August 2018. M.S., Aeronautics and Astronautics, University of Washington, Seattle, August 2017. B.S., Mechanical Engineering, University of Alabama, Tuscaloosa, May 2015.
RESEARCH	My research interests lie at the intersection of gasdynamics, mathematics, and technology: <ul style="list-style-type: none">• High enthalpy, compressible, and reactive fluid flows. Included is the design, analysis, and manufacturing of aerospace propulsion systems.• Nonlinear dynamical analysis, numerical methods, and scientific computing for the characterization of aerospace engine dynamics. A two-sided mathematical approach involves 1) data-driven nonlinear dynamical analysis for the purpose of extracting coherent spatial-temporal structures within experimental data, and 2) simplified CFD simulations with the goal of identifying and describing nonlinear feedback mechanisms.• The development of open-source and open-access engineering tools to aid in propulsion system design and analysis.
PROFESSIONAL EXPERIENCE	<p>Graduate Research Assistant High Enthalpy Flow Laboratory <i>Sep. 2017 - Present</i></p> <ul style="list-style-type: none">• Lead researcher and laboratory manager• Conduct and supervise experiments and data reduction• Construct and run numerical simulations• Lead team of 10+ graduate and undergraduate students in laboratory and hardware development <p>Graduate Research Intern Jet Propulsion Laboratory <i>Jan. 2017 - Aug. 2017</i></p> <ul style="list-style-type: none">• Performed fluid-structure interaction simulations in support of Mars 2020 mission• Investigated nonlinear dynamical responses of spacecraft under extreme loading• Extracted aerodynamic stability limits from nonlinear models for free-flight Mars Sample Return module <p>Graduate Research Assistant Advanced Propulsion Laboratory <i>Sep. 2015 - Dec. 2016</i></p> <ul style="list-style-type: none">• Explored the fluidic response of ice under impact loading• Modeled entry, decent, and landing for a concept Europa lander exploiting ice plume/spacecraft interactions.• Led experimental hypervelocity impact studies in support of modeling efforts <p>Associate Mechanical Engineer GoHypersonic, Inc., Dayton, Ohio <i>May 2015 - Aug. 2015</i></p> <ul style="list-style-type: none">• Completed coupled structural-thermal analysis of direct-connect scramjet engine• Assisted with detailed design and systems integration of <i>HIFiRE 6</i> hypersonic flight experiment

- Performed launch-load analysis of the *HIFiRE 6* hypersonic vehicle
- Completed heat transfer analysis of ablative materials along scramjet flowpath

SKILLS

Operating systems: Windows, Linux.

Programming languages: Fortran, C++, Python.

Software (open): Octave, numpy, sciPy, Jupyter, OpenFOAM, Clawpack.

Software (proprietary): LS-DYNA, Ansys Fluent, Abaqus, MATLAB, HyperWorks, LabView, SolidWorks.

PROFESSIONAL
ORGANIZATIONS

American Institute of Aeronautics and Astronautics (AIAA)

American Society of Mechanical Engineers (ASME)

Society of Industrial and Applied Mathematics (SIAM)

PUBLICATIONS

Journal:

- Boening, J.A., Wheeler, E.A., Heath, J.D., **Koch, J.V.**, Mattick, A.T., Breidenthal, R.E., Knowlen, C., and Kurosaka, M., "Rotating Detonation Engine Using a Wave Generator and Controlled Mixing," *Journal of Propulsion and Power*, 2018.
- Winglee, R.M., Robinson, T., Danner, M., **Koch, J.V.**, "Cryo-braking using penetrators for enhanced capabilities for the potential landing of payloads on icy solar system objects," *Acta Astronautica*, 2018.

Conference Proceedings:

- **Koch, J.V.**, Washington, M.R., Kurosaka, M., Knowlen, C., "Operating Characteristics of a CH₄/O₂ Rotating Detonation Engine in a Backpressure Controlled Facility," 2019 AIAA Aerospace Sciences Meeting, American Institute of Aeronautics and Astronautics, 2019.
- Danner, M., Winglee, R., **Koch, J.V.**, "Crater Morphology of Engineered and Natural Impactors into Planetary Ice," AGU Fall Meeting, 2017.
- Boening, J.A., Heath, J.D., Byrd, T.J., **Koch, J.V.**, Mattick, A.T., Breidenthal, R.E., Knowlen, C., Kurosaka, M., "Design and Experiments of a Continuous Rotating Detonation Engine: a Spinning Wave Generator and Modulated Fuel/Oxidizer Mixing," 52nd AIAA/SAE/ASEE Joint Propulsion Conference, 2016.

Other:

- "Kilometer-scale Transient Atmospheres for Kinetic Payload Deposition on Icy Bodies," Aeronautics and Astronautics Master's thesis, 2017.