630-779-3396
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U.S. Citizen

Kelly Mathesius, PhD

kjmath.github.io/portfolio

An engineer with skills in data analysis, modeling and optimization of constrained systems, scientific software, manufacturing, and technical communication. Excited to apply multi-disciplinary experience to new challenges in scientific software.

SKILLS

Programming: python, git, SQL (BigQuery)
Data Analysis: numpy, pandas, seaborn, matplotlib, lmfit, pingouin, statsmodels, scikit-learn
Computational Optimization: CasADi, AeroSandbox

EDUCATION

Massachusetts Institute of Technology *Cambridge, MA*
Doctor of Philosophy in Space Propulsion (Aerospace Engineering) *Sept 2019 - June 2023*
- Key classes: matrix methods in data analysis and machine learning, numerical methods, statistics, rocket propulsion

Master of Science in Aeronautics and Astronautics *Sept 2017 - June 2019*
Bachelor of Science in Aerospace Engineering *Sept 2013 - June 2017*

WORK EXPERIENCE

Formlabs *Somerville, MA*
Research and Development Engineer *June 2023 - Present*
- Model stereolithography (liquid resin) printing physics in python: **custom PDE solver** for the Reynolds equation to model fluid pressure on parts; custom fluid-structure interaction model to assess coupled effects between printer stiffness, resin properties, and part motion; optical/fluid model to optimize layer height, exposure time, and print time. Clearly document model equations, assumptions, and outputs.
- Write SQL queries for print metrics and metadata; analyze data with **statistical methods** (ANOVA/t-test with effect size) **and regression models**; visualize data in python and Grafana; use data and models to predict next-gen printer performance
- Propose experiments, collect data, and analyze results to improve print quality and speed

MIT International Center for Air Transportation *Cambridge, MA*
Graduate Researcher *Sept 2017 – June 2023*
- Developed an **end-to-end differentiable model in python** for exhaust plume radiant emission of rocket motors; utilized model and AeroSandbox computational framework to optimize aircraft design and analyze performance tradeoffs
- Designed and conducted experiments to measure the effects of solid rocket motor design parameters on exhaust plume radiant emission
- Managed a team of undergraduate researchers

Blue Origin *Kent, WA*
Engines Materials and Processes Intern *June - August 2019*
- Identified, mixed, and characterized alternative extrude honing media for improving interior surface finish of cast or additively manufactured metal components
- Designed and built a test rig for evaluating extrude honing media; tested effectiveness of developed media at improving surface finish of test coupons

Boeing *Huntsville, AL*
SLS Flight Termination System Intern, SLS Cryo Filters and Valves Intern *June - August 2016, 2017*
- Compiled and presented test procedure data packages for the Space Launch System's flight termination system pyrotechnics to NASA for Range Safety approval
- Designed and prototyped a life cycle tester for valve limit switches at < 5% of cost of original plan; developed a MATLAB tool to filter and analyze data for lot acceptance testing of switches