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| 630-779-3396  [kelly.mathesius@gmail.com](mailto:kelly.mathesius@gmail.com)  U.S. Citizen | **Kelly Mathesius**, PhD | [kjmath.github.io/portfolio](https://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](https://lmfit.github.io/lmfit-py/), [pingouin](https://pingouin-stats.org/build/html/index.html), statsmodels, scikit-learn  
**Computational Optimization:** [CasADi](https://web.casadi.org/), [AeroSandbox](https://github.com/peterdsharpe/AeroSandbox#readme)

**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](https://github.com/peterdsharpe/AeroSandbox#readme) 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