

Sebastián Rojas Mata

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Education

California Institute of Technology

Pasadena, CA

B.S. IN MECHANICAL ENGINEERING

June 2013

- Emphasis on combustion, compressible flow, and space propulsion

Princeton University

Princeton, NJ

PHD IN MECHANICAL AND AEROSPACE ENGINEERING

October 2018

- Advisor: Edgar Y. Choueiri, Electric Propulsion and Plasma Dynamics Laboratory

Work Experience

AdAstra Rocket Company

Liberia, Costa Rica

INTERN

July-August 2011

- Finite element analysis of parts and assemblages to verify structural stability
- Short design project for solar panel structure using SolidWorks

Explosion Dynamics Laboratory

Caltech

SUMMER UNDERGRADUATE RESEARCH FELLOW

May-September, 2012

- Advisor: Dr. Joseph Shepherd
- Designed, built, and tested a two-color ratio pyrometer for non-contact thermometry as part of a hot particle ignition experiment

Teaching Experience

Mechanical and Civil Engineering Department

Caltech

TEACHING ASSISTANT

March - June, 2013

- Course: ME 18b Thermodynamics
- Graded problem sets and held office hours for sophomore thermodynamics course

Mechanical and Aerospace Engineering Department

Princeton University

ASSISTANT IN INSTRUCTION

2014-2016

- Courses: MAE 501/502 Mathematical Methods of Engineering Analysis I/II
- Graded problem sets and exams, provided exam review sessions, and lectured for first year graduate applied mathematics courses

W.E.B. DuBois Summer Institute

Princeton University

FACULTY

July 2016

- Courses: Mathematical Logic, Mathematical Reasoning
- Taught two four-week courses for Pre-Scholars (rising 8th and 9th graders) on introductory proof-based mathematics

Chemical and Biological Engineering Department

Princeton University

ASSISTANT IN INSTRUCTION

2016

- Course: CBE 501 Mathematical Methods of Engineering Analysis I
- Graded problem sets and exams and held office hours for first year graduate applied mathematics courses

Skills

Languages Spanish (native), English (fluent), German (8 years)

Programming MATLAB, Mathematica, C/C++, Python, JavaScript, HTML/CSS, Git, Bash

Document Prep. L^AT_EX, Microsoft Office (Word, PowerPoint, Excel)

Awards and Fellowships

- 2010 Caltech Alumni Association Spirit Award
- 2012 Caltech Bibi Jentoft-Nilsen Award
- 2013 Caltech Marcella Bonsall Summer Undergraduate Research Fellowship
- 2013 Caltech Robert L. Noland Leadership Award
- 2016 Princeton MAE Department Crocco Award for Teaching Excellence
- 2017 Princeton Program in Plasma Science and Technology Fellowship

Publications

1. Rojas Mata, S., Choueiri, E. Y., Jorns, B. A., and Spektor, R., “PRINCE: A Software Tool for Characterizing Waves and Instabilities in Plasma Thrusters,” *52nd AIAA/SAE/ASEE Joint Propulsion Conference*, Salt Lake City, UT, July 2016, AIAA-2016-4533.
2. Plasek, M., Wordingham, C. J., Rojas Mata, S., Luzarraga, N., Choueiri, E. Y., and Polk, J. E., “Experimental Investigation of a Large-Diameter Cathode,” *50th AIAA/ASME/SAE/ASEE Joint Propulsion Conference*, Cleveland, OH, July 2014, AIAA-2014-3825.

Presentations

Lab Group Research Talks

Princeton, NJ

ELECTRIC PROPULSION AND PLASMA DYNAMICS LAB

2014-2017

- Technical overviews of various topics: two-color optical pyrometry theory, magnetic induction probe theory and design, implementation of complex root-finding algorithms, and the laser induced fluorescence diagnostic for dispersion relation measurements

PRINCE: A Software Tool for Characterizing Waves and Instabilities in Plasma Thrusters

Salt Lake City, UT

52ND AIAA/SAE/ASEE JOINT PROPULSION CONFERENCE

July 2016

- Overview of root-finding and root-tracking numerical algorithms implemented in prototype PRINCE software

Software and diagnostics for the study of instabilities in partially magnetized plasmas

Toulouse, France

E×B PLASMAS FOR SPACE AND INDUSTRIAL APPLICATIONS WORKSHOP

June 2017

- Discussion of ongoing research involving the numerical and experimental characterization of arbitrary plasma dispersion relations

Software Development

Plasma Rocket Instability Characterizer (PRINCE)

Princeton, NJ

FUNDING: JPL'S SPONTANEOUS INNOVATIVE CONCEPTS

2015-2017

- Interactive software tool with versatile data input for studying waves and instabilities in plasma thrusters
- Features friendly GUI, parametric control of input parameters, and simple data visualization routines
- Prototype version implemented in Wolfram Research's Mathematica 10
- Open-source version implemented through Git's Electron framework with C++ routines for numerical calculations under development