Andrew M. Chap

andrew@andrewchap.com
(240) 687-2518
Superior, Colorado, USA

Code samples and portfolio:
www.andrewchap.com
github.com/andrewchap

Education

- **Ph.D., Aerospace Engineering** — November 2017
  M.S., Aerospace Engineering — May 2015
  University of Maryland, College Park, MD — GPA: 3.92
- **B.A., Physics** — May 2006
  College of the Holy Cross, Worcester, MA — GPA: 3.56

Programming and Analysis Skills

Proficiency:	Python, Bash, C, CUDA, NumPy, Dash/Plotly, Matplotlib, Pandas, SciPy, MATLAB/MEX reveal.js, git, SVN, Vim, Torque, AWS, Google Cloud Platform
Moderate experience:	C++, C#, TensorFlow, LaTeX/TikZ, HTML/CSS, Jenkins, Slurm
Some experience:	JavaScript, SQL, CMake, OpenMP, VTK/ParaView, Julia

Relevant Experience

Personal/hobby Projects

- Created a mortgage analysis **Python** module, unique in that it uses the time-value of money to calculate a long-term valuation of loans and investments. I am now using this module in the development of a mortgage analysis web-application, using **Dash**/**Plotly**/**CSS** frontend on **Google Cloud Platform**.
- Designed a neural network on **AWS** to predict the output of a discontinuous function of two variables with **Python**/**NumPy** and then translated it into **TensorFlow**, for the sake of curiosity & self-improvement.
- Created a computer game proof-of-concept using Unity3D and **C#**.
- Owner and maintainer of the num2tex and symdim Python modules.

Maxar Technologies — *Westminster, CO*
Site Reliability Engineer — July 2019 - Present

- Built a "Maxar Acronyms and Info" Slack bot with commands for slack users to query, add and modify entries. Created functions to read definitions from legacy web pages. Created admin options to see activity, recover deleted/modified entries, and get usage statistics, all from within Slack. To power the bot, I created an **AWS Lambda** function and a custom **Python** module with ElastiCache for quick storage & retrieval. This Slack bot is used by many coworkers, especially new employees during on-boarding.
- Took on responsibility for creating organizational **AWS** commercial/GovCloud accounts, with IAM roles tied to security groups. Automated this process with a script with logging and fault recovery, then handed off operation of this script to the operations team.
- Took a leadership role in major-incident retrospective meetings, by assuming responsibility working with service owners to translate agreed-upon action items into tickets, as action items were previously mostly untracked. Initiated a team Trello board for organizing team duties.

Tech-X Corporation — *Boulder, CO*
Associate Research Scientist — December 2017 - July 2019

- Improved the algorithm for the speed-limited particle-in-cell method and modified the **C++** source code, resulting in a $1.5\times$ speed increase and a 75% decrease in error for the relevant canonical test problem.
- Developed an object-oriented framework with **Python**/**NumPy**/**SciPy** to detect a when a plasma physics simulation reaches steady-state using a combination of t-tests and f-tests between temporally delineated data windows, enabling comparisons of results between simulations of differing time-scales.

- Delivered an internal presentation on creating interactive/web-friendly/engaging presentations with **reveal.js**/**Plotly** and provided a company-themed template, used by co-workers for their own conference presentations.
- Created a test harness to characterize computational performance and memory usage differences across code modifications for hundreds of test problems, using **Bash**/**Python**/**Pandas** resulting in quick turnarounds in performance reporting for computational engine developers.

Space Power and Propulsion Laboratory *University of Maryland*
Graduate Research Assistant January 2012 - December 2017

- Translated serial **MATLAB** simulation code into **C** and parallel **CUDA** code resulting in a 150× speedup.
- Developed a hybrid local/global optimizer to maximize simulated fusion power output by adjusting the voltages of a series of beam guides.
- Used GPU computing to generate large sets of data as a basis for creating a new heuristic model for Coulomb collisions, published in APS Physical Review.

NASA Johnson Space Center *Houston, TX*
Graduate Intern/NASA Space Technology Research Fellow Jan-Jul 2013, Jul-Sep 2014, Jul-Nov 2015

- Designed, calibrated, and operated an ion current probe and high-voltage 2 kHz switch with an oscilloscope and a magnetic sensor probe to profile a charged-particle beam and make design recommendations for a second-generation experiment.
- Developed a simulation of the experiment, coupling plasma kinetics with electronics and resulting in a recommendation of optimal operating parameters, to advise on future hardware purchases.

Patent

- Sedwick, R. J., Chap, A. M., Systems, Methods, and Devices for Inertial Electrostatic Confinements US Provisional Patent Application 62/367,410, July 27, 2016

Publications

Peer-reviewed

- Chap, A. M., Sedwick, R. J., Coulomb collision model for use in non-thermal plasma simulation, *Physical Review E* **95**:6 063209 (2017)
- Chap, A. M., Sedwick, R. J., One-Dimensional Semianalytical Model for Optimizing the Standing-Wave Direct Energy Converter, *Journal of Propulsion and Power* **31**:5 1350-1361 (2015)
- Werner, G. R., Jenkins, T. G., Chap, A. M., Cary, J. R., Speeding up simulations by slowing down particles: Speed-limited particle-in-cell simulation, *Physics of Plasmas* **25**:12 123512 (2018)

Ph.D. Thesis

- Chap, A. M., Simulation and Optimization of an Inertial Electrostatic Confinement Fusor *University of Maryland* (2017)

Conference Papers

- Chap, A. M., Sedwick, R. J., Simulation and Optimization of the Continuous Grid Inertial Electrostatic Confinement Fusion Device, *53rd AIAA/ASME/SAE/ASEE Joint Propulsion Conference* 2017-4678 (2017)
- Chap, A. M., Sedwick, R. J., Inertial Electrostatic Confinement Fusion Simulation and a Statistical Treatment of Coulomb Collisions, *51st AIAA/ASME/SAE/ASEE Joint Propulsion Conference,* AIAA 2016-4776 (2016)
- Chap, A. M., Sedwick, R. J., Simulation of an Inertial Electrostatic Confinement Device Using a Hermite N-body Individual Time-step Scheme, *51st AIAA/ASME/SAE/ASEE Joint Propulsion Conference,* AIAA 2015-3860 (2015)
- Chap, A. M., Sedwick, R. J., A Hybrid Particle-in-cell Simulation for a Multiple Grid Magnetic Core Inertial Electrostatic Confinement Device, *50th AIAA/ASME/SAE/ASEE Joint Propulsion Conference,* AIAA 2014-3516 (2014)
- Chap, A. M., Tarditi, A.G., Sedwick, R. J., Numerical and Experimental Investigation on the Traveling Wave Direct Energy Converter Concept, *50th AIAA/ASME/SAE/ASEE Joint Propulsion Conference,* AIAA 2014-3559 (2014)