Izaak B. Beekman

(301) 244 - 9367 ◆ Izaak@IzaakBeekman.com

Objective

A research, analysis or software development position as a data scientist conducting data analytics with large scale data sets or an analyst position in the defence/aerospace sector.

Experience

SOFTWARE ENGINEERING RESEARCH CONSULTANT, SOURCERY INC.

JULY 2014 – PRESENT
◆ Research and design an efficient communication scheme with automatic data dependency tracking for a nonlinear partial differential equation solver

GRADUATE RESEARCH ASSISTANT, PRINCETON/UMD CCROCCO LAB

SEPTEMBER 2007 – PRESENT
◆ Made complex changes to in-house simulation codes to handle new and larger cases and modern computing hardware
◆ Found and fixed previously undetected bugs
◆ Leading a study using very large domains to simulate smooth wall hypersonic turbulent boundary layers, which generates about 8 TB of data per each of 4 data sets
◆ 20% reduction in I/O time and 18% compression of output files for main CFD code
◆ Helped manage the lab move from Princeton and setup at UMD
◆ Trained new graduate student research assistants
◆ Led adoption of version control, software testing, and improved organization
◆ Presented research papers and gave talks at AIAA and APS professional conferences
◆ All research funded by NASA and the United States Air Force with P.I. Dr. Pino Martin

UNDERGRADUATE RESEARCH ASSISTANT, GWU

◆ Setup and ran low Reynolds number airfoil visualization experiments including model and mount design and fabrication, dye injection and imaging configurations with the Flow Simulation and Analysis Group (FSAG) with P.I. Dr. Rajat Mittal

Education

PRINCETON UNIVERSITY
Doctoral candidate, anticipated graduation: September 2015
Thesis Title: *DNS of high-speed turbulent boundary layers and the effects of wall boundary conditions*
M. A., Mechanical and Aerospace Engineering: June 2010

THE UNIVERSITY of MARYLAND
Faculty Research Assistant: September 2014 – present
Visiting graduate student: June 2009 – September 2014

THE GEORGE WASHINGTON UNIVERSITY
B. S., Mechanical and Aerospace Engineering, mathematics minor, *summa cum laude*: 2007
2006 Goldwater Scholar
Alfred Martin Freudenthal Prize: Highest scholastic achievement in GWU SEAS

National Agency Check with Investigation (NACI) cleared
U.S. citizen

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Open Source Software Contribution

JSON-FORTRAN: A FORTRAN 2008 JSON API

https://github.com/jacobwilliams/json-fortran
- CMake build system
- Continuous integration (CI) and test coverage automation with Travis-CI and codecov.io
- UCS4 support
- Numerous bug fixes

Selected Publications and Presentations

REFEREED JOURNAL ARTICLES
- Duan, L., **Beekman, I.B.**, and Martin, M. P., "Direct Numerical Simulation of Hypersonic Turbulent Boundary Layers. Part III: Effect of Mach Number", *Journal of Fluid Mechanics*, 672, pages 245-267, 2011.
- Duan, L., **Beekman, I.B.**, and Martin, M.P., "Direct Numerical Simulation of Hypersonic Turbulent Boundary Layers. Part II: Effect of Wall Temperature", *Journal of Fluid Mechanics*, 655, pages 419-445, 2010.

AIAA CONFERENCE PAPERS AND PUBLICATIONS
- **Beekman, I.B.**, Priebe, S., and Martin, M.P. "SDNS of large domain supersonic boundary layers over weakly and strongly adiabatic walls," AIAA Paper AIAA-2014-0954, 52nd Aerospace Sciences Meeting, National Harbor, MD, Jan. 13-17, 2014
- Kan, Y.C., **Beekman, I.B.**, and Martin, M.P., "Turbulence Structure and Wall Signature in Hypersonic Boundary Layer," AIAA Paper AIAA-2013-3119, 43rd AIAA Fluid Dynamics Conference and Exhibit, San Diego, California, Jun. 24-27, 2013.
- **Beekman, I.B.**, Priebe, S., Kan, Y.C., and Martin, M.P., "DNS of a Large-Domain, Mach 3 Turbulent Boundary Layer Turbulence Structure," AIAA Paper 2011-753, 49th AIAA Aerospace Sciences Meeting including the New Horizons Forum and Aerospace Exposition, Orlando, Florida, Jan. 4-7, 2011.

MANUSCRIPT IN PREPARATION
- **Beekman, I.B.** and Martin, M.P. "Spectral Analysis of Mach 3 and Mach 7 Large-Domain Turbulent Boundary Layers Using Two Adiabatic Boundary Conditions," *in preparation*

Skills Summary

- Scientific software engineering in a UNIX environment for High Performance Computing (HPC)
- *Modern* Fortran, Make, Subversion, Git, CMake, bash, PBS, FFTW, Linux, Mac, MS Office, LaTeX
- Currently learning: C, Python
- *Large* data sets and simulations
- Lustre file systems
- HDF5 file format and library
- MPI – Message passing interface library
- OpenMP
- Performance tuning
- Cray, SGI and COTS HPC clusters
- Applied mathematics
- Descriptive statistics
- Chaotic, non-linear, partial differential equations
- Efficient numerical simulation
- Turbulence and turbulence modeling
- Strong writing and communication skills

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