

# JOSEPH SHOER

joseph.shoer@gmail.com

www.josephshoer.com

## EDUCATION

- 2006-2011** **Cornell University**, Ithaca, NY  
Ph.D., Aerospace Engineering with minor in Astronomy (2011)  
M.S., Aerospace Engineering (2009)  
*Coursework in dynamic systems, spacecraft dynamics, multivariable controls, and planetary astronomy*  
*Research in spacecraft systems, dynamics, controls, and technologies*
- 2002-2006** **Williams College**, Williamstown, MA  
B.A., Physics, Cum Laude with Honors Thesis (2006)  
*Coursework in classical mechanics, quantum mechanics, optics, and electromagnetic theory*

## PROFESSIONAL EXPERIENCE

- 2007-2010** **Teaching Assistant**, College of Engineering, Cornell University  
▪ Courses taught: *Feedback Control Systems, Applied Systems Engineering, and Spacecraft Engineering*
- 2009** **NASA Student Intern**, Loads and Structural Dynamics Branch (ES6), Johnson Space Center  
▪ Developed multibody dynamics simulation of Lunar Electric Rover Concept suspension system
- 2003-2006** **Tutor and Student Coordinator**, Math/Science Resource Center, Williams College  
▪ Conducted weekly physics tutoring sessions for 5-15 students (2003-2006)  
▪ Organized and coordinated student tutors in math and the sciences (2005-2006)
- 2004, 2005** **Summer Research Student**, Fiber Laser Lab, Physics Department, Williams College  
▪ Performed laboratory investigations of dynamic behaviors of an all-fiber picosecond pulse laser  
▪ Developed nonlinear numerical simulations of the fiber laser
- 2001, 2002** **Summer Intern**, High-Energy Astrophysics Division, Harvard-Smithsonian Center for Astrophysics  
▪ Developed code for TRACE satellite image analysis and data processing

## SKILLS

Dynamics analysis, control design, numerical simulation, image processing, and graphical modeling. Laboratory experience with class IV lasers, superconductors, magnetic systems, cryogenics, motion capture, system identification, and microgravity flight testing. Programming and scientific computing experience with MATLAB, Simulink, Mathematica, HTML, Fortran, Java, C++, IDL, and LabVIEW. Graphical modeling experience with MSC/ADAMS, SketchUp, and Radiant. Additional computing experience with PhotoShop, Word, PowerPoint, Excel, and Visio.

## ACTIVITIES AND PROFESSIONAL ORGANIZATIONS

- 2010-2011** **NASA Student Ambassador**
- 2007-2011** **American Institute of Aeronautics and Astronautics**  
*Student Member*
- 1999-2010** **1Lt, Ithaca Composite Squadron, Civil Air Patrol**  
*Deputy Commander for Cadets and Aerospace Education Officer*  
▪ Planned and supervised the implementation of Cadet Program activities  
▪ Conducted aerospace education outreach for cadets and senior members  
▪ Rated Aerospace Education Officer (Technician Level) and Cadet Programs Officer (Technician Level)  
▪ Former Cadet Commander and Cadet 2<sup>nd</sup> Lieutenant, Lt Col Frank Pocher Minute-Man Squadron, MA

## AWARDS

- 2006-2007** **NASA/New York Space Grant Graduate Fellowship**, Cornell University
- 2006** **Howard P. Stabler Prize in Physics**, Williams College
- 2002** **Frank G. Brewer Award for Excellence in Aerospace Education**, Northeast Region, Civil Air Patrol
- 2001** **Major General Billy Mitchell Award**, National Headquarters, Civil Air Patrol

## INVITED TALKS AND APPEARANCES

- 9 Jun 2009      **Known Universe: Construction Zone**  
BASE Productions for the National Geographic Channel
- 10 Apr 2009    **Flux-Pinned Modular Spacecraft and Engineering After Williams**  
Williams College Department of Physics colloquium

## PUBLICATIONS

- Shoer, J. and Peck, M. "Udwadia-Kalaba Equations for Constrained 3D Rigid Body Dynamics with Quaternion States." *Journal of Applied Mechanics*. (Submitted)
- Shoer, J. and Peck, M., "Flux-Pinned Interfaces for the Assembly, Manipulation, and Reconfiguration of Modular Space Systems," *Journal of the Astronautical Sciences*, vol. 57, no. 3, 2011.
- Shoer, J., Wilson, W., Jones, L., Knobel, M., and Peck, M., "Microgravity Demonstrations of Flux Pinning for Station-Keeping and Reconfiguration of CubeSat-Sized Spacecraft," *Journal of Spacecraft and Rockets*, vol. 47, no. 6, 2010.
- Shoer, J. and Peck, M., "Reconfigurable Spacecraft as Kinematic Mechanisms," *Journal of Spacecraft and Rockets*, vol. 46, no. 2. 2009.
- Shoer, J. and Peck, M., "Stiffness of a Flux-Pinned Virtual Structure for Modular Spacecraft," *Journal of the British Interplanetary Society*, vol. 62, no. 2. 2009.

## CONFERENCE PROCEEDINGS

- Shoer, J. and Peck, M., "Simulation of Multibody Spacecraft Reconfiguration through Sequential Dynamic Equilibria," *AIAA Guidance, Navigation, and Control Conference*. 2010.
- Wilson, W., Jones, L., Shoer, J., and Knobel, M., "Results of Flux-Pinning Modular Spacecraft Demonstration in Microgravity," *AIAA Region I Young Professional, Student, and Education Conference*. Honorable mention award.
- Shoer, J. and Peck, M., "Sequences of Passively Stable Dynamic Equilibria for Hybrid Control of Reconfigurable Spacecraft," *AIAA Guidance, Navigation, and Control Conference*. 2009.
- Wilson, W., Shoer, J., and Peck, M., "Demonstration of a Magnetic Locking Flux-Pinned Revolute Joint for Use on CubeSat-Standard Spacecraft," *AIAA Guidance, Navigation, and Control Conference*, 2009.
- Shoer, J., "Flux-Pinned Interfaces for the Assembly, Manipulation, and Reconfiguration of Modular Space Systems," *AIAA Guidance, Navigation, and Control Conference and Exhibit*, 2008. "Best Paper in Session" award.
- Shoer, J. and Peck, M., "A Flux Pinned Magnet-Superconductor Pair for Close-Proximity Station Keeping and Self-Assembly of Spacecraft," *AIAA Guidance, Navigation, and Control Conference*. 2007.
- Reeves, K.K. *et al.*, "New Observations of Oscillating Coronal Loops," *Eos Trans. AGU*, 82(47), Fall Meeting Supplement, Abstract SH11A-0704. 2001.

## THESIS AND DISSERTATION

- Shoer, Joseph. "Dynamics of Reconfigurable Multibody Space Systems Connected by Magnetic Flux Pinning." Dissertation, Cornell University. 2011
- Shoer, Joseph. "Simulation of a Passively Modelocked All-Fiber Laser with Nonlinear Optical Loop Mirror." Thesis, Williams College. 2006.