

Christine M. Hartzell

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Education:**PhD, Aerospace Engineering, May 2012****University of Colorado at Boulder**

Advisor: Dr. Dan Scheeres

B.S., Aerospace Engineering**Highest Honors****Georgia Institute of Technology, May 2008**

Christine Hartzell is an Assistant Professor in the Department of Aerospace Engineering at the University of Maryland. Prior to coming to UMD, she was a postdoctoral fellow at the California Institute of Technology, where she was developing a computational model of regolith-spacecraft interaction to aid in the design of future sample collection and mobility systems on planetary bodies (Moon, Mars, asteroids). Her graduate research, funded by the NASA Earth and Space Science Fellowship, focused on the dynamics of surface dust particles on near Earth asteroids. Specifically, her work focused on the influence of cohesive and electrostatic forces on the motion of dust particles. She has also conducted her research under a grant from the National Science Foundation at the Institute of Space and Astronautical Science in Japan for 10 weeks. Her work has been presented at several conferences and journal papers. She has been awarded the NASA Earth and Space Science Fellowship, the Amelia Earhart Fellowship and received honorable mention for the National Science Foundation Graduate Researcher Fellowship.

Research and Work Experience:**Assistant Professor***University of Maryland*

Department of Aerospace Engineering

Feb. 3, 2014 – Present

- Studying regolith on low gravity planetary bodies (asteroids and the Moon) in order to understand the evolution of these bodies and to improve the design of spacecraft to explore them. Specifically interested in granular flows and electrostatic dust motion.

Keck Institute for Space Studies Postdoctoral Fellow*California Institute of Technology*

Topic: Granular Mechanics, Physics

July 9, 2012 – Present

- Began development of a Contact Dynamics (computational) simulation to model the interaction of regolith with the sample sieving device on the Mars Science Lab rover.

Research Assistant*University of Colorado at Boulder*

Topic: Orbital Mechanics, Plasma Physics

Advisor: Dr. Dan Scheeres

Aug. 22, 2008 – June 2012

- NASA Earth and Space Science Fellowship Recipient 2009, 2010, 2011
- Amelia Earhart Fellowship Recipient 2009, 2010
- National Science Foundation Graduate Researcher Fellowship Program Honorable Mention 2009
- Dissertation Title: The Dynamics of Near-Surface Dust on Airless Bodies
- Explored surface dynamics of asteroid dust particles including electrostatic and cohesive effects.

Principal Investigator

National Science Foundation / Institute of Space and Astronautical Science (JAXA)

Topic: Orbital Mechanics, Plasma Physics

Supervisor: Dr. Junichiro Kawaguchi

June 15, 2010 – Aug. 24, 2010

- Funded through NSF and Japan Society for the Promotion of Science (JSPS) to conduct research in Japan.
- Research conducted at Institute for Space and Astronautical Sciences (JAXA).
- Explored natural mechanisms potentially resulting in dust launching from asteroids and potential engineering applications of plasma physics and dust research completed to date.

Publications:

Journal:

- C. Hartzell**, X. Wang, D. Scheeres, M. Horanyi. "Experimental Demonstration of the Role of Cohesion in Electrostatic Dust Lofting" *Geophysical Research Letters*. 2013. Vol 40, pp 1038-1042.
- C. Hartzell**, D. Scheeres. "Dynamics of Levitating Dust Particles Near Asteroids and the Moon" *Journal of Geophysical Research*. 2013. Vol 118, pp 116-125.
- C. Hartzell**, D. Scheeres. "The Role of Cohesive Forces in Particle Launching on the Moon and Asteroids" *Planetary and Space Sciences*. 2011. Vol 59, pp 1758-1768.
- D. Scheeres, **C. Hartzell**, P. Sánchez, M. Swift. "Scaling Physics to Asteroid Surfaces: The Role of Cohesion" *Icarus*. 2010. Vol 210, pp 968-984.
- J.R. Masiero, **C.M. Hartzell**, D.J. Scheeres. "The Effect of the Dust Size Distribution on Asteroid Polarization" *The Astronomical Journal*. Dec. 2009. Vol 139, pp 1557-1562.

Conference:

- C. Hartzell**, M. Hunt. "Contact Dynamics Models for Spacecraft-Regolith Interactions" Division of Fluid Dynamics Conference. November 2013. Poster.
- C. Hartzell**, M. Zimmerman, Y. Takahashi. "Numerical Studies of Electrostatic Dust Motion about Itokawa" Division for Planetary Sciences Conference. October 2013. Poster.
- C. Hartzell**, M. Hunt. "Contact Dynamics Simulations for Surficial Regolith Motion" NASA Lunar Science Forum. July 2013. Poster.
- C. Hartzell**, D. Scheeres, J. McMahon, Y. Takahashi. "Electrostatic Dust Motion About Complex Asteroid Shapes" American Geophysical Union Fall Meeting, December 2012.
- C. Hartzell**, X. Wang, D. Scheeres, M. Horanyi. "An Experimental Demonstration of the Importance of Cohesion in Electrostatic Dust Lofting" Division for Planetary Science Conference. October 2012.
- C. Hartzell**, X. Wang, D. Scheeres, M. Horanyi. "Experimental Demonstration of the Importance of Cohesion in Electrostatic Dust Lofting" NASA Lunar Science Forum. July 2012.
- C. Hartzell**, D. Scheeres. "Dynamics of Levitating Dust on the Moon and Asteroids" *Dust, Atmosphere and Plasma*. June 2012.
- C. Hartzell**, X. Wang, D. Scheeres, M. Horanyi. "Experimental Demonstration of the Importance of Cohesion in Electrostatic Lofting of Small Grains" Workshop on the Physics of Dusty Plasmas. May 2012.
- C. Hartzell**, D. Scheeres, X. Wang. "Electrostatic Dust Motion on Asteroids: Current Understanding" *Asteroids, Comets and Meteors*. May 2012.
- C. Hartzell**, D. Scheeres. "Studies of 3D Dust Motion about Asteroids" IEEE Aerospace Conference. March 2012.
- C. Hartzell**, D. Scheeres. "Understanding 1D Dust Levitation" American Geophysical Union Fall Meeting. December 2011. Poster.
- C. Hartzell**, D. Scheeres. "Dynamics of Levitating Dust Near Equilibria on Asteroids" Division of Planetary Sciences (AAS) Conference. October 2011.
- C. Hartzell**, D. Scheeres. "Granular Mechanics and Dusty Plasmas" Contributed Talk. *Granular Flows: From Simulations to Astrophysical Applications*. June 2011.

- C. Hartzell**, D. Scheeres. "Implications of Electrostatics and Cohesion for Asteroid Surface Exploration" IEEE Aerospace Conference. March 2011.
- C. Hartzell**, D. Scheeres. "Dynamics of Levitating Dust Particles near Asteroids" AIAA/AAS Spaceflight Mechanics Conference. Feb 2011.
- C. Hartzell**, D. Scheeres. "Electrostatic Dust Launching Methods" Division of Planetary Sciences Conference 2010.
- C. Hartzell**, D. Scheeres. "The Significance of Cohesive Forces in Understanding Planetary Electrostatic Dust Lofting" Scientific Assembly of the Committee on Space Research. 2010.
- C. Hartzell**, D. Scheeres. "The Implications of Lunar Water on Electrostatic Dust Levitation" Lunar and Planetary Science Conference. 2010. Poster.
- D. Scheeres, **C. Hartzell**, P. Sánchez, M. Swift. "The Relevance and Role of Cohesive Forces for Small Asteroids" Lunar and Planetary Science Conference. 2010.
- C. Hartzell**, D. Scheeres. "The Dynamics of Electrostatically Levitated Particles from Asteroids" Lunar Dust, Plasma and Atmosphere: The Next Steps Meeting. 2010.
- C. Hartzell**, D. Scheeres. "The Dynamics of Dust Levitated from Asteroids" Division of Planetary Sciences Conference 2009. Poster.
- C. Hartzell**, S. Cheng. "A Feasibility Study of On-Board Cloud Detection and Compression" IEEE Aerospace Conference 2010.
- C. Hartzell**, J. Carpena, L. Graham, D. Racek, T. Tao, C. Taylor, H. Goldberg, C. Norton. "Data System Design for a Hyperspectral Imaging Mission Concept" IEEE Aerospace Conference 2009
- A.M. Korzun, B.P. Smith, **C.M. Hartzell**, S.K. Martinelli, K.B. Hott, L.A. Place, C.Y. Yu, R.D. Braun. "Entry, Descent and Landing System Design for the Mars Gravity Biosatellite" International Planetary Probe Workshop 2008
- P.J. Pingree, L.J. Scharenbroich, T.A. Werne, **C.M. Hartzell**. "Implementing Legacy C Algorithms in FPGA Co-Processors for Performance Accelerated Smart Payloads" IEEE Aerospace Conference 2008
- C.M. Hartzell**. "Ablator Sizing Results for the Mars Gravity Biosatellite", AIAA Region 2 Student Conference 2007

Other:

JPL New Technology Report #47297: Detection of Clouds in Hyperspectral Imager Data. 2009.

Awards:

Graduate:

- NASA Earth and Space Science Fellowship Recipient 2009, 2010, 2011
- Amelia Earhart Fellowship Recipient 2009, 2010
- National Science Foundation Graduate Researcher Fellowship Program Honorable Mention 2009

Undergraduate:

- Honors Recognition Program, 2006 and 2007, at Georgia Tech indicating status as one of the top five students in the class.
- Boeing Women in Engineering Scholarship – Spring 2007
- Presidential Undergraduate Research Award, Fall 2006 for research in Biomedical Engineering
- Presidential Undergraduate Research Award, Spring 2006 for research in Biomedical Engineering
- Northrop Grumman Women in Engineering Scholarship - Spring 2006
- United Technologies Women In Engineering Scholarship - Spring 2005
- Society of Women Engineers Chapter Scholarship - Spring 2005

Service:

Professional Society Memberships:

- Chair, Caltech Postdoc Association
- American Institute of Aeronautics and Astronautics (AIAA)
- Institute of Electrical and Electronics Engineers (IEEE)
- American Geophysical Union (AGU)
- Division for Planetary Sciences – American Astronomical Society (Junior Member)

Papers Reviewed for:

- Celestial Mechanics and Dynamical Astronomy
- Journal of Guidance, Control and Dynamics
- Planetary and Space Sciences