

Kevin Robert Grazier Ph.D.

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Summary of Qualifications

- Computational physicist with work in Solar System dynamics and evolution, algorithm and numerical method development, extracting information from large simulation data sets.
- Published in planetary science, astronomy, computer science, numerical analysis, and spacecraft operation journals, as well as popular science books and magazines.
- Fifteen years of experience in spacecraft operations.
- Fluent in C, C++, FORTRAN, UNIX shell scripting, and HTML; conversant in Java, Python, and PHP.
- Excellent oral communications—have performed numerous television appearances along with hundreds of speaking engagements.
- Technical consultant on several TV series and feature films. Earned a certificate in television screenwriting from UCLA. One produced pilot screenplay.
- Excel at explaining complicated technical topics to laypeople.

Post-doctoral Professional Experience

Scientist

July 2018 – May 2019

Meteoroid Environment Office
NASA / Marshall Spaceflight Center
Huntsville, AL 35812

Numerically modeled the dynamics of meteoroid streams in order to assess the impact hazard to the ISS, Gateway, as well as future interplanetary missions. Processed CMOR radar data of the 2015 and 2018 gamma Lyrid shower streams with the goal of identifying the parent body. Processed camera data to determine fireball trajectories and orbits. Contracted through Aerodyne Corporation.

Assistant Professor of Computer Science

July 2016 – July 2018

United States Military Academy
West Point, NY 10996

Taught an introductory Information Technology/Python programming class taken by all first-year cadets. Research focused on numerical method development, extracting information from large simulation data sets, and Solar System evolution and dynamics. Mentored cadets through individual instruction and club involvement. Graduate of USMA Master Teacher Program, and winner of the George F. Adam Award for Teaching with Technology.

Research Scientist

December 1995 – March 2011

Jet Propulsion Laboratory
Pasadena, CA 91109

Held dual roles of Science Planning Engineer and Investigation Scientist for the Imaging Science Subsystem instrument on the Cassini/Huygens Mission to Saturn and Titan. Wrote award-winning multi-mission planning and analysis software. On Cassini, software was used in all three mission phases: tour planning and selection, observation planning and flight rule checking, and data analysis. Generated and maintained the Cassini Tour Atlas of geometric data for observation planning. Wrote software to auto-generate Tour Atlas for new or updated mission trajectories—software not only allowed navigators to plan the extended mission trajectories with the optimal science return, it also saved the project an estimated \$250K. Acted as lead or co-lead for 12 sequence implementation teams, and as co-lead on three tour sequence update teams. Served as Imaging Team representative in Cassini Rings Target Working Team. For Constellation Program, edited Altair surface operations documents.

Post-doctoral Professional Experience (Cont'd)

Adjunct Professor

August 1999 – July 2018

Taught undergraduate classes in planetary science, stellar astronomy, physics, cosmology, and the search for extraterrestrial life, at Santa Monica College, Los Angeles Pierce College, and UCLA Extension. Created “The Science of Science Fiction” class at UCLA Extension.

Education

University of California, Los Angeles, CA 90095-1567

Doctor of Philosophy, Geophysics and Space Physics

Master of Science, Geophysics and Space Physics

Certificate in television screenwriting from UCLA Writer’s Program. December 2011

Dissertation: The Stability of Planetesimal Niches in the Outer Solar System: A Numerical Investigation

Purdue University, West Lafayette, IN 47907

Master of Science, Physics

Bachelor of Science, Geology

Bachelor of Science, Computer Systems and Programming

Oakland University, Rochester, MI 48309

Bachelor of Science, Physics

Activities and Honors

Honorary Research Fellow at University of Southern Queensland, Australia (2019 -)

Department of the Army Commander’s Award for Civilian Service (2018)

United States Military Academy George F. Adam Award for Teaching with Technology (2018)

United States Military Academy Master Teacher Program Graduate (2018)

Science Ambassador, APOPO (2016 -)

Attended White House OSTP Workshop: Homesteading in Space, Inspiring the Nation through Science Fiction (2016)

Board of Advisors, The Hollywood Sci-Fi Museum (2015-)

Journal of Astronomy and Earth Science Education Advisory Board (2014-2015)

Purdue University School of Science Outstanding Alumni Award (2013)

Attended National Academy of Science’s Summit on Science, Entertainment, and Education (2011)

NASA Tech Brief Award (2010, 2004)

NASA Board Act Award (2010)

NASA Space Act Award (2010, 2004)

Guest Instructor, Launchpad Workshop, University of Wyoming (2010)

Oakland University Odyssey Distinguished Alumni Award (2009)

JPL Level C Bonus Award (2008, 2000)

Attended the invitation-only Sci-Foo Unconference at Google HQ (2008)

JPL Ranger Bonus Award (2007)

George Foster Peabody Award for Excellence in Electronic Media (2006, for *Battlestar Galactica*)

JPL NOVA Award (2001, 2000, 1997)

NASA New Technology Award (1998)

JPL Multimission Ground System Office Achievement Award (1997)

NASA OSS Educational Products Review Panels (2001-present)

First-ever Honorary Chairperson, Oakland University “Week of Champions” (Homecoming) celebration.

Challenger Center “Journey through the Universe” Visiting Researcher (2000-2010)

Duncombe Award for Student Research, American Astronomical Society/Division of Dynamical Astronomy

Select Publications

Journal Articles

- Grazier, K.R., J. Horner, J.C. Castillo-Rogez, 2019. The Relationship between Centaurs and Jupiter Family Comets with Implications for K-Pg-type Impacts. *Monthly Notices of the Royal Astronomical Society*, <https://doi.org/10.1093/mnras/stz2872>
- Grazier, K.R., J.C. Castillo-Rogez, J. Horner, 2018. It's Complicated: A Big Data Approach to Exploring Planetesimal Evolution in the Presence of Jovian Planets. *Astronomical J.*, 156:232. DOI: <https://doi.org/10.3847/1538-3881/aae095>
- Grazier, K.R., 2016. Jupiter: Cosmic Jekyll and Hyde. *Astrobiology*. **16**. No. 1, 23-38. DOI: 10.1089/ast.2015.1321
- Grazier, K.R., J.C. Castillo-Rogez, P. Sharp. 2014. Dynamical Delivery of Volatiles to the Outer Main Belt. *Icarus*. **232**, 13–21. DOI:10.1016/j.icarus.2013.12.011
- Grazier, K.R., P.W. Sharp, and W.I. Newman, 2013. Störmer-based Close Encounter Schemes. *Astron. J.* **145**, 112. DOI:10.1088/0004-6256/145/4/112
- Sharp, P.W., M.A. Qureshi, and K.R. Grazier, 2012. High Order Explicit Runge-Kutta Nystrom Pairs *Numerical Algorithms*, **62**, No. 1, 133-148. DOI: 10.1007/s11075-012-9571-0.
- Sharp, P.W., J.C. Castillo-Rogez, K.R. Grazier, 2012. The Performance of Phase-lag-enhanced ERKN Pairs on N-Body simulations. *Journal of Computational and Applied Mathematics*. **236**, 2378-2386. DOI: 10.1016/j.cam.2011.11.024.
- Sharp, P.W. Sharp, J. Castillo-Rogez, and K. Grazier, 2010. Coupled Geophysical and Orbital Evolution of Saturn's Satellites. *Proceedings of 41st Lunar and Planetary Science Conference*.
- Grazier, K.R., C. Roumeliotis, and R. D. Lange, 2010. Automating the Generation of the Cassini Tour Atlas Database, *Proceedings of SpaceOps 2010*, Huntsville, AL.
- Grazier, K.R., W.I. Newman, J.M. Hyman, and P.W. Sharp 2005. Long Simulations of the Solar System: Brouwer's Law and Chaos. *ANZIAM J.* **46(E)** C1086--C1103.
- Grazier, K.R., W.I. Newman, D.G. Goldstein, J.M. Hyman, and P.W. Sharp, 2005. Achieving Brouwer's Law with High-order Störmer Multistep Methods. *ANZIAM J.* **46(E)** C101-C119.
- Porco, C.C., *et al.* 2005. Imaging of Titan from the Cassini Spacecraft. *Nature*, **434**, 159-168.
- Porco, C.C., *et al.* 2005. Cassini Imaging Science: Initial Results on Saturn's Rings and Small Satellites. *Science*. **307** no. 5713, 1226—1236.
- Porco, C.C., *et al.* 2005. Cassini Imaging Science: Initial Results on Phoebe and Iapetus. *Science*. **307** no. 5713, 1237—1242.
- Porco, C.C., *et al.* 2005. Cassini Imaging Science: Initial Results on Saturn's Atmosphere. *Science*. **307** no. 5713, 1243—1246.
- Grazier, K.R., W.I. Newman, W.M. Kaula, and J.M. Hyman, 1999. Dynamical Evolution of Planetesimals in the Outer Solar System. I. The Jupiter/Saturn Zone. *Icarus*. 140(2).
- Grazier, K.R., W.I. Newman, F. Varadi, W.M. Kaula, and J.M. Hyman, 1999. Dynamical Evolution of Planetesimals in the Outer Solar System. II. The Saturn/Uranus and Uranus/Neptune Zones. *Icarus* 140(2).

Grazier, K.R., 1997. The Stability of Planetesimal Niches in the Outer Solar System: A Numerical Investigation. Ph.D. Dissertation. William I. Newman advisor.

Select Conference Abstracts

- Newman, W.I., Sharp, P.W., and, Grazier, K.R., 2015. The Öpik Approximation and Giant Planet Shielding of the Inner Solar System, *Bulletin of the American Astronomical Society*, **46**, #103.02.
- Sharp, P.W., J. Castillo, K. Grazier, D. Matson, T. Johnson, 2009 SATORB - a new model for satellite dynamics, *New Zealand Mathematics Colloquium*, Massey University at Albany, December 8-10.
- Grazier, K.R., P.W. Sharp, and J. Castillo-Rogez 2009. SATORB – A New Model for Satellite Dynamics. *Bulletin of the American Astronomical Society*. **41**, no 3.
- Grazier, K.R., W.I. Newman, P. Sharp, 2008. Jupiter as a Sniper Rather Than a Shield, *Bulletin of the American Astronomical Society*, **40**, no 3, 404.
- Newman, W.I., P. Sharp, K.R. Grazier, 2008. High Degree of Freedom Dynamics, Weak Chaos, and the Outer Solar System, *Bulletin of the American Astronomical Society*, **40**, no 3, 404.
- Grazier, K.R., L. Dones, and P. Sharp, 2007. Planetesimal Migration in the Outer Solar System and the Composition of the Scattered Disk. *Bulletin of the American Astronomical Society*. **39**, no 2, 314.
- Grazier, K.R., F. Varadi, 2001. The Fate of Planetesimals and the Migration of the Jovian Planets. *Bulletin of the American Astronomical Society*. **33**, no 3, 1197.
- Grazier, K.R., M.E. Lipschutz, 2000. Numerical Examination of the Long-Term Coherency of Meteoroid Streams in Near-Earth Orbit, *Bulletin of the American Astronomical Society*, **32**, no. 2, 859.
- Newman, W.I., F. Varadi, A.Y. Lee, W.M. Kaula, K.R. Grazier, and M. Hyman, 2000. Numerical Integration, Lyapunov Exponents, and the Outer Solar System, *Bulletin of the American Astronomical Society*. **32**. no 2, 859.
- Grazier, K.R., W.I. Newman, and A.B. Chamberlin, 1998. Close Approach Modeling and the Fate of 29/P Schwassmann-Wachmann 1, *Bulletin of the American Astronomical Society* **30**, no. 3.
- Grazier, K.R., W.I. Newman, F. Varadi, and W.M. Kaula, and J.M. Hyman, 1997. Where have the Other Asteroid Belts Gone? *Bulletin of the American Astronomical Society*, **29**, no. 3.
- Newman, W.I., K.R. Grazier, F. Varadi, and W.M. Kaula, 1997. Close Encounters of the Symplectic Kind: Integration Methods and Chaotic Dynamics, *Bulletin of the American Astronomical Society*. **29**, no. 3.
- Grazier, K.R., W.I. Newman, F. Varadi, and W.M. Kaula, 1996. Integrators for Long-Term Solar System Dynamical Simulations., *Bulletin of the American Astronomical Society*, **28**, no. 3, 1181.
- Grazier, K.R., W.I. Newman, W.M. Kaula, F. Varadi, and J.M. Hyman, 1995. An Exhaustive Search for Stable Orbits Between the Outer Planets, *Bulletin of the American Astronomical Society*, **27**, no. 2, 1204.
- Newman W.I. , F. Varadi, K. Grazier, W. M. Kaula, 1995. Mappings and Integrators on the Edge of Chaos, *Bulletin of the American Astronomical Society*. **27**, no. 2, 1200.
- Bell, R.E., K.R. Grazier, W.I. Newman, W.M. Kaula, J.M. Hyman, 1994. Long Term Integrations of the Solar System: Simplicity Beats Symplecticity, *Bulletin of the American Astronomical Society*. **26**, no. 2, 1023.