

TIMOTHY E. DOWLING

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Department of Mechanical Engineering
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I. PERSONAL

Education

- 1984-1989 California Institute of Technology, Pasadena, CA. Ph.D. in Planetary Science.
Dissertation: A Dynamical Study of Jupiter's Great Red Spot.
- 1980-1984 University of Virginia, Charlottesville, VA. B.S. in Physics and Mathematics, with
Highest Distinction

Employment

- 7/97 – pres Associate Professor, Department of Mechanical Engineering at the University of
Louisville, Louisville, KY. Teaching thermodynamics, fluid mechanics, heat
transfer and computational fluid dynamics.
- 8/90 – 6/97 Assistant Professor, Department of Earth, Atmospheric, and Planetary Sciences,
Massachusetts Institute of Technology, Cambridge, MA. Taught planetary physics
and geophysical fluid dynamics.
- 12/88 – 7/90 Postdoctoral Research Associate, Department of Astronomy, Cornell University,
Ithaca, NY.

Professional Societies

- American Astronomical Society (AAS)
- American Geophysical Union (AGU)
- American Meteorological Society (AMS)

Awards and Recognitions

- Outstanding Scholarship, Research and Creative Activity Award, Basic and Applied
Sciences, University of Louisville, 2006
- Minor Planet (Asteroid) 3529 named Dowling, International Astronomical Union (IAU),
1996
- Jephtha H. and Emily V. Wade Award, Massachusetts Institute of Technology, 1991
- Sigma Xi Anniversary Prize for Excellence in Undergraduate Research, University of
Virginia, 1984
- Phi Beta Kappa, Chapter Beta of Virginia, 1984

II. TEACHING

Courses taught at the University of Louisville

School of Engineering (1997-2007)

ME 251 Thermodynamics I

ME 311 Fluid Mechanics I

ME 401 Fluid Mechanics II

ME 440 Heat Transfer

ME 638 Computational Fluid Dynamics

Recent Course Evaluations

Term	Course	Classroom Presentation	Overall Course Effectiveness	Overall Instructor Effectiveness	Avg. Grade	
					U	G
Fall 2002	ME 251-1 and 251-2 Thermodynamics I	4.00±0.82	4.04±0.81	4.15±0.72	83%	
		4.33±0.66	4.19±0.60	4.35±0.67	80%	
Spring 2003	ME 251-2 Thermodynamics ME 638 Comp. Fluid Dyn.	4.50±0.53	4.40±0.52	4.40±0.52	80%	
		4.00±0.82	3.75±0.96	4.25±0.50	93%	
Fall 2003	ME 251-1 and 251-2 Thermodynamics I	3.81±0.94	3.96±1.00	4.00±1.02	83%	
		3.72±1.07	3.78±0.73	3.67±1.05	83%	
Spring 2004	ME 251-1 Thermodynamics ME 638 Comp. Fluid Dyn.	4.23±0.81	4.27±0.63	4.36±0.49	84%	
		4.13±0.83	4.25±0.71	4.25±0.71	88%	
Fall 2004	ME 251-1 and 251-2 Thermodynamics I	4.29±0.78	4.16±0.69	4.21±0.79	79%	
		4.43±0.81	4.35±0.75	4.68±0.67	79%	
Spring 2005	ME 251-1 Thermodynamics I	4.50±0.61	4.35±0.67	4.50±0.61	84%	
Fall 2005	ME 311-1 Fluid Mechanics I ME 401-1 Fluid Mechanics II	4.58±0.69	4.21±0.71	4.67±0.59	80%	
		4.40±0.58	4.28±0.61	4.52±0.65	91%	
Spring 2006	ME 311-3 Fluid Mechanics I ME 440-1 Heat Transfer	4.00±0.97	3.96±0.85	4.30±0.70	85%	
		3.25±1.11	3.33±0.96	3.58±0.97	82%	
Fall 2006	ME 311-1 Fluid Mechanics I ME 401-1 Fluid Mechanics II	4.09±0.53	3.91±0.83	4.00±0.63	74%	
		4.19±0.68	4.00±0.54	4.25±0.63	85%	
Spring 2007	ME 311-1 Fluid Mechanics I ME 440-1 Heat Transfer	3.91±0.68	3.91±0.75	4.23±0.68	83%	
		3.67±0.73	3.78±0.75	4.00±0.73	87%	

Table Notes: Evaluations are shown with standard deviations and are based on the scale 1= poor to 5 = excellent.

Teaching Innovations

- Led the development of the UofL Bachelor of Science in Atmospheric Science degree program
- Developed a new course, ME 638 Computational Fluid Dynamics
- Recruited and advised the UofL Mech. Eng. Dept.'s first postdoctoral research associate

III. RESEARCH

Books Edited

1. Bagenal F, Dowling T, McKinnon W (eds.), 2004, *Jupiter: The Planet, Satellites, and Magnetosphere*, Cambridge University Press.

Refereed Articles

1. Palotai CsJ., Dowling TE, 2007, Addition of water and ammonia cloud microphysics to the EPIC model, *Icarus*, in review.
2. Herrnstein A, Dowling TE, 2007, Effects of topography on the spinup of a Venus atmospheric model, *J. Geophys. Res.* 112, E04S08, doi:10.1029/2006JE002804.
3. Dowling TE, Bradley ME, Colón E, Kramer J, LeBeau RP, Lee GCH, Mattox TI, Morales-Juberías R, Palotai CsJ, Parimi VK, Showman AP, 2006, The EPIC atmospheric model with an isentropic/terrain-following hybrid vertical coordinate, *Icarus* 182, 259-273.
4. García-Melendo E, Sánchez-Lavega A, Dowling TE, 2005, Jupiter's 24° N highest speed jet: vertical structure deduced from nonlinear simulations of a large-amplitude natural disturbance, *Icarus* 176, 272-282.
5. Morales-Juberías R, Dowling TE, 2005, Simulations of high-latitude spots on Jupiter: constraints on vortex strength and the deep wind, *Planet. Space Sci.* 53, 1221-1233.
6. Ingersoll AP, Dowling TE, Gierasch PJ, Orton GS, Read PL, Sánchez-Lavega A, Showman AP, Simon-Miller AA, Vasavada AR, 2004, Chapter 6. Dynamics of Jupiter's Atmosphere, in *Jupiter: The Planet, Satellites, and Magnetosphere*, Bagenal, Dowling, and McKinnon (eds.), Cambridge Univ. Press, 105-128.
7. Morales-Juberías R, Sanchez-Lavega A, Dowling TE, 2003, EPIC simulations of the merger of Jupiter's White Ovals BE and FA: Altitude-dependent behavior, *Icarus* 166, 63-74.
8. Sromovsky LA, Fry PM, Baines KH, Limaye SS, Orton GS, Dowling TE, 2001, Coordinated 1996 HST and IRTF Imaging of Neptune and Triton. I. Observations, navigation, and differential deconvolution, *Icarus* 149, 416-434.
9. Sromovsky LA, Fry PM, Baines KH, Dowling TE, 2001, Coordinated 1996 HST and IRTF Imaging of Neptune and Triton. II: Implications of disk-integrated photometry, *Icarus* 149, 435-458.
10. Sromovsky LA, Fry PM, Dowling TE, Baines KH, Limaye SS, 2001, Coordinated 1996 HST and IRTF Imaging of Neptune and Triton. III: Neptune's atmospheric circulation and cloud structure, *Icarus* 149, 459-488.

11. Stratman PW, Showman AP, Dowling TE, Sromovsky LA, 2001, EPIC simulations of bright companions to Neptune's Great Dark Spots, *Icarus* 151, 275-285.
12. Showman AP, Dowling TE, 2000, Nonlinear simulations of Jupiter's 5-micron hot spots, *Science*, 289, 1737-1740.
13. Dowling TE, Fischer AS, Gierasch PJ, Harrington J, LeBeau RP, Santori CM, 1998, The explicit planetary isentropic-coordinate (EPIC) atmospheric model, *Icarus* 132, 221-238.
14. LeBeau RP, Dowling TE, 1998, EPIC simulations of time-dependent, three dimensional vortices with application to Neptune's Great Dark Spot, *Icarus* 132, 239-265.
15. Harrington J, Dowling TE, Baron RL, 1996, Jupiter's tropospheric thermal emission I: Data and techniques, *Icarus* 124, 22-31.
16. Harrington J, Dowling TE, Baron RL, 1996, Jupiter's tropospheric thermal emission II: Power spectrum analysis and wave search, *Icarus* 124, 32-44.
17. Dowling TE, 1995, Estimate of Jupiter's deep zonal-wind profile from Shoemaker-Levy 9 data and Arnol'd's second stability criterion, *Icarus* 117, 439-442.
18. Hammel HB, Beebe RF, Ingersoll AP, Orton GS, Mills JR, Simon AA, Chodas P, Clarke JT, De Jong E, Dowling TE, Harrington J, Huber LF, Karkoschka E, Santori CM, Toigo A, Yeomans D, West RA, 1995, HST Imaging of atmospheric phenomena created by the impact of comet Shoemaker-Levy 9, *Science* 267, 1288-1296.
19. Orton G, A'Hearn M, Baines K, Deming D, Dowling T, Goguen J, Griffith C, Hammel H, Hoffmann W, Hunten D, Jewitt D, Kostiuk T, Miller S, Noll K, Zahnle K, Achilles N, Dayal A, Deutsch L, Espenak F, Esterle P, Friedson AJ, Fast K, Harrington J, Hora J, Joseph R, Kelly D, Knacke R, Lacy J, Lisse C, Rayner J, Sprague A, Shure M, Wells K, Yanamandra-Fisher P, Zipoy D, Bjoraker G, Buhl D, Golisch W, Griep D, Kaminski C, Arden C, Chaikin A, Goldstein J, Gilmore D, Fazio G, Kanamori T, Lam H, Livengood T, MacLow M-M, Marley M, Momary T, Robertson D, Romani P, Spitale J, Sykes M, Tennyson J, Wellnitz D, Ying S-W, 1995, Collision of comet Shoemaker-Levy 9 with Jupiter observed by the NASA infrared telescope facility, *Science* 267, 1277-1282.
20. Harrington J, Lebeau RP, Backes KA, Dowling TE, 1994, Dynamic response of Jupiter's atmosphere to the impact of comet Shoemaker-Levy 9, *Nature* 368, 525-527.
21. Ingersoll AP, Kanamori H, Dowling TE, 1994, Atmospheric gravity waves from the impact of comet P/Shoemaker-Levy 9 with Jupiter, *Geophys. Res. Lett.* 21, 1083-1086.
22. Dowling TE, 1993, A relationship between potential vorticity and zonal wind on Jupiter, *J. Atmos. Sci.* 50, 14-22.
23. Stamp AP, Dowling TE, 1993, Jupiter's winds and Arnol'd's second stability theorem: Slowly moving waves and neutral stability, *J. Geophys. Res.* 98, 18,847-18,855.
24. Dowling TE, Spiegel EA, 1990, Stellar and Jovian vortices, *Ann. N.Y. Acad. Sci.* 617, 190--216.

25. Dowling TE, Ingersoll AP, 1989, Jupiter's Great Red Spot as a shallow water system, *J. Atmos. Sci.* 46, 3256-3278.
26. Dowling TE, 1989, Rotating Rayleigh-Benard convection with fixed-flux boundaries, *Woods Hole Oceanographic Institute Tech. Report WHOI-89-26*, 230-247.
27. Dowling TE, Ingersoll AP, 1988, Potential vorticity and layer thickness variations in the flow around Jupiter's Great Red Spot and White Oval BC, *J. Atmos. Sci.* 45, 1380-1396.
28. Dowling TE, Muhleman DO, Berge GL, 1987, Aperture synthesis observations of Saturn and its rings at 2.7-mm wavelength, *Icarus* 70, 506-516.
29. Smith BA, Soderblom L, Beebe R, Boyce JM, Brahic A, Briggs GA, Brown RH, Collins SA, Cooke II AF, Croft SK, Cuzzi JN, Danielson GE, Davies ME, Dowling TE, Godfrey D, Hansen CJ, Harris C, Hunt GE, Ingersoll AP, Johnson TV, Krauss RJ, Masursky H, Morrison D, Owen T, Plescia J, Pollack JB, Porco CC, Rages K, Sagan C, Shoemaker EM, Sromovsky LA, Stoker C, Strom R, Suomi VE, Synnott SP, Terrile RJ, Thomas P, Thompson WR, Veverka J, 1986, Voyager 2 in the Uranian system: Imaging science results, *Science* 233, 43-64.
30. Poon SJ, Dowling TE, 1984, Superconductivity of the allotropic forms of zirconium-based alloys obtained by liquid quenching on hot substrates, *Solid State Comm.* 50, 189-191.

Review and Encyclopedia Articles

1. Dowling TE, Showman AP, 2006, Chapter 9. Earth as a Planet: Atmosphere and Oceans, *Encyclopedia of the Solar System*, 2nd Ed., Academic, 169-188.
2. Bagenal F, Dowling TE, McKinnon WB, 2004, Chapter 1. Introduction, in *Jupiter: the Planet, Satellites and Magnetosphere*, Bagenal, Dowling, and McKinnon (eds.), Cambridge Univ. Press., 1-18.
3. Dowling TE, 2003, Jupiter, *Encyclopedia of Space Science and Technology*, Wiley, 871-889.
4. Dowling TE, 2001, Oceans, *Encyclopedia of Astronomy and Astrophysics*, IOP Publishing LTD and Nature Publishing Group, 1919-1928.
5. Dowling TE, 1997, Jupiter: Atmosphere, *Encyclopedia of Planetary Sciences*, Shirley J.H. & Fairbridge, R.W., Eds., Chapman & Hall, 367-371.
6. Dowling TE, 1995, Dynamics of Jovian atmospheres, *Ann. Rev. Fluid Mech.* 27: 293-334.
7. Dowling TE, 1994, Successes and failures of shallow-water interpretations of Voyager wind data, *Chaos* 4, 213-225.

Invited Conference Abstracts

1. Dowling TE, 2006, Handling the topography of Venus with a hybrid sigma-theta coordinate GCM, Amer. Geophys. U. Chapman Conference “Exploring Venus as a Terrestrial Planet,” February 13-17, Key Largo, FL USA.
2. Dowling TE, 2004, Invited, SA51B-01 On striving to simulate all known atmospheres equally well, Amer. Geophys. U. 2004 Joint Assembly, 145.

Popular Magazines

1. Dowling TE, 2007, Partly Cloudy with a Chance of Wow, *Astronomy*, in press.
2. Dowling TE, 1996, The winds of Jupiter (De winden op Jupiter), *Zenit* (Dutch astronomy magazine), June, 256-260.
3. Dowling TE, 1994, Jovian fireworks, *Odyssey* (children's science magazine), June, 42-43.
4. Dowling TE, 1990, Big, blue: The twin worlds of Uranus and Neptune, *Astronomy* 18: 42-53.

Television

1. Dowling TE, 2007, interview, *The Universe: Jupiter*, premiered June 19 on the History Channel.
2. Dowling TE, 2001, interview, *Planet Storm*, premiered May 28 on Britain's Channel 4 and June 17 on the Discovery Channel.
3. Harrington J, Lebeau RP, Backes KA, Dowling TE, 1994, interview, computer simulation, *Dynamic response of Jupiter's atmosphere to the impact of comet Shoemaker-Levy 9*, April 6, NBC Nightly News; 1996, *The Doomsday Asteroid*, PBS Nova; 2007, *The Universe: Jupiter*, History Channel.
4. Dowling TE, Ingersoll AP, 1990, computer simulation, Jupiter's Great Red Spot as a shallow water system, *To Boldly Go*, PBS Nova.

Internet

1. Dowling TE, 2007, interview, Cool Jobs: Planetary Meteorologist, *Discovery Video News*, http://www.youtube.com/watch?v=Bcolxoi_n6M.
2. Dowling TE, 2007, interview, Planets Shed Light on Earth's Weather, *Discovery Video News*, <http://www.youtube.com/watch?v=Ryy6HmqLJkk>

Radio

1. Dowling TE, 2006, phone interview, Saturn's south-polar hurricane, *The Final Word*, Bloomberg Radio, November 10, 2006

2. Dowling TE, 2004, *State of Affairs*, local talk show, topic: planetary weather, WFPL Louisville, February 17.
3. Dowling TE, 1996, studio interview following NASA Galileo Probe press conference, *The World*, WGBH & BBC Public Radio International, January 22.
4. Dowling TE, 1996, studio interview about Galileo Probe, *The Connection*, WBUR Boston, January 23.

Thesis Advising

Doctor of Philosophy

1. Palotai Cs J, 2006, Modeling Jupiter's atmospheric dynamics with an active hydrological cycle, Ph.D. in Mechanical Engineering, U. Louisville
2. LeBeau RP, 1997, Simulations of time-dependent three-dimensional vortices with application to Neptune's Great Dark Spot, Ph.D. in Planetary Science, MIT
3. Harrington J, 1995, Planetary infrared observations: the occultation of 28 Sagittarii by Saturn and the dynamics of Jupiter's atmosphere, Ph.D. in Planetary Science, MIT

Master of Science

1. O'Malley C, 2003, Computational fluid dynamics model of natural convection airflow inside a commercial 30" wall oven using FLUENT, M.S. in Mechanical Engineering, U. Louisville.

Master of Engineering

1. Stratman, PW 2000, Simulations of bright companions to Neptune's Great Dark Spots, M.Eng. in Mechanical Engineering, U. Louisville
2. Allison PB, 1999, Simulations of spot merging in Jupiter's atmosphere: sensitivity to vertical structure, M.Eng. in Mechanical Engineering, U. Louisville

Bachelor of Science

1. Fish VL, 1997, Modeling stellar occultation data of Triton's atmosphere, B.S. in Physics and B.S. in Earth, Atmospheric, and Planetary Science, MIT
2. Santori CM, 1997, Effects of vertical PV structure on Saturn's polar region, B.S. in Physics, MIT
3. Pinder JD, 1992, A numerical investigation of rotating Rayleigh-Benard convection with fixed flux boundaries, B.S. in Physics, MIT

National Science Teams

Comet Shoemaker-Levy 9 Impact with Jupiter, 1994
 Member, Hubble Space Telescope Science Team
 Member, Infrared Telescope Facility Science Team

Voyager Encounter with Uranus, 1986
 Graduate Assistant, Imaging Science Team

External Research Funding

Agency	PI / Co-PI	Project Title	Period	\$K
NASA Planetary Atmospheres	T. Dowling	Development of the EPIC Atmospheric Model with Comparative Planetology Applications to Jupiter and Saturn	08/15/05 08/14/08	257
NASA Outer Planet Research	T. Dowling	Development and Application of Active Hydrological Cycles to General Circulation Models of the Known Giant Planets	05-01-05 04-30-08	185
NSF Planetary Astronomy	T. Dowling	Atmospheric Dynamics Modeling of Venus with Realistic Topography and Structure and Comparative Modeling of Titan	07-01-04 06-30-07	171
NASA Kentucky EPSCoR 2001	T. Dowling / G. Huang (U.K.)	Development and Application of High-End Engineering and Planetary CFD Models on Optimized PC Clusters	08/01-07/04	148
NASA Planetary Atmospheres	T. Dowling	General Circulation of Planetary Atmospheres	06/01-06/04	247

UofL 1998-2001	257
UofL TOTAL	1,265
MIT 1991-1997	405
Career TOTAL	1,670

NOTE: This table lists the UofL portion for multi-institute grants and excludes any internal matching funds.

IV. SERVICE

National

- NASA Peer Review Panels
 - Cassini Data Analysis Program, Atmospheres Subpanel, 2006
 - Outer Planets Research Program, Giant Planets Subpanel, 2005
 - Planetary Atmospheres Program, Dynamics Subpanel, 2003 (chair), 1998, 1995, 1992
 - Vision Missions, Planetary Subpanel, 2003
 - Hubble Space Telescope Time Allocation Committee, 2000
 - Planetary Astronomy Program, 1997
- NSF Peer Review Panels
 - Planetary Astronomy, 2005 (chair)
- Science Advisory Committees
 - NASA Planetary Systems Science/Management Operations Working Group (PSS-MOWG), 2006-08
 - NASA Astrophysical Analogs Working Group, 1998
 - Adler Planetarium of Chicago, 1998
- Journal Editorships
 - Associate Editor, *J. Geophys. Res. (Planets)*, 1995-1997
- Journal Peer Reviewer
 - Advances in Space Research*
 - Dynamics of Atmospheres and Oceans*
 - Icarus*
 - International Journal for Numerical Methods in Fluids*
 - Journal of Fluid Mechanics*
 - Journal of Geophysical Research*
 - Journal of the Royal Astronomical Society of Canada*
 - Monthly Weather Review*
 - Nature*
 - Quarterly Journal of the Royal Meteorological Society*
 - Science*
- Grant Proposal Reviewer
 - NASA Planetary Atmospheres Program
 - NASA Planetary Astronomy Program
 - NASA Outer Planets Research Program
 - NASA Discovery Missions Program
 - NASA Vision Missions
 - NASA Minority University Research Program
 - NSF Planetary Astronomy Program
 - U.S. Civilian Research and Development Foundation
- Conference Organizing Committees
 - National Weather Service: Midwest Bow Echo Workshop, Local Org. Comm., 2007

AAS/Division for Planetary Sciences Meeting, Local Org. Comm.,
2006, 2004 (chair)
AAS/DPS Meeting, Program Comm., 2001, 1998
Hybrid-Isentropic Modeling Workshop, Local Org. Comm., 2002 (chair)

- Intel International Science & Engineering Fair (ISEF)
Grand Awards Judge for Earth and Space Science, 2002

University of Louisville

- University
President's Distinguished Faculty Achievement Award Comm., 2007
Research Advisory Council, 2005-07
Mentor, Future Professors Program, 2002
- School of Engineering
CECS Dept. Chair Search Committee, 2001-02
Ph.D. Thesis Committees
Cynthia Forgie, IE
Yang Xu, ME, 2006
Hari Chandrasekaran, CHE, 2004
G. Friedrichs, CHE, 2001
M. Eng. Thesis Committees
Mr. Henry, CEE, 2000
Sonja Svihla, CHE, 1998
- Department of Mechanical Engineering
ME Graduate Studies Coordinator, 2000-03
ME Biomech. Engineer Faculty Search Committee (hired Dr. K. Sharp), 2000

Louisville and Kentucky

- Judge, Kentucky Science and Engineering Fair (KY-SEF), 2003–2007 (inaugural to present)
- UofL Certificate of Appreciation awarded April 27, 2001, for planetary science presentations given to various Louisville-area elementary schools