

CURRICULUM VITAE

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Professional Interests

Teaching physics and math, nonlinear dynamics and chaos, pattern formation, fluid dynamics, computational physics, relativistic visualization, work and quantum spin, neural networks and control.

Research Highlights

- I recently studied the fundamental question, which has been neglected in both the teaching and research literature, as to whether a magnetic field can do work on an atom's magnetic moment [R. J. Deissler, Phys. Rev. E **77**, 036609 (2008)].
- While the magnetic field does no work on the electron-orbital contribution to the magnetic moment, whether or not it does work on the electron-spin contribution to the magnetic moment depends on whether the electron has an intrinsic rotational kinetic energy associated with its spin.
- If the electron does have a rotational kinetic energy, which is shown to be consistent with the Dirac equation, the acceleration of a silver atom in a Stern-Gerlach experiment or the emission of a photon from an electron spin flip can be explained without requiring the magnetic field to do work.
- For my thesis, I introduced the concept of *noise-sustained structure*, a structure or pattern sustained by the presence of microscopic noise in convectively unstable systems.
- Since any spatially extended system with nonzero group velocity is convectively unstable at the onset of instability, noise-sustained structure is expected to be very common in nature.
- In addition to open-flow fluid systems, noise-sustained structure has been found to occur in systems as varied as side-branching in dendrites, nonlinear optics, and traffic flow.
- My three papers on *noise-sustained structure* [R.J. Deissler, J. Stat. Phys. **40** (1985) 371; J. Stat. Phys. **54** (1989) 1459; Physica **25D** (1987) 233] together have been cited over 350 times according to the Science Citation Index (searching for Deissler RJ).
- Overall I have more than 30 publications, which together have been cited over 1100 times, according to the Science Citation Index.

- I have been invited to a number of international conferences to lecture on my work on pattern formation in nonlinear systems, including 3 in Japan and 4 in Europe.

Education

Ph.D., Physics, University of California, Santa Cruz, 3-86; University of California, Santa Cruz, 9-83 to 1-86 (except for leave of absence spring and summer quarters 1984 while at the Institute for Advanced Study, Princeton).

M.S., Physics, University of Illinois, Urbana-Champaign, 8-75; University of Illinois, Urbana-Champaign, 9-74 to 7-77 and 1-79 to 5-80.

B.S., Physics, Case Western Reserve University, Cleveland, Ohio, 5-74; Case Western Reserve University, 9-70 to 5-74.

Thesis

“Noise-Sustained Structure in Dynamical Systems”

Advisors: Peter Scott (Santa Cruz) and Doyne Farmer (Los Alamos)

Professional Experience

Reviewer, Physical Review and Physical Review Letters (approx. 1990 to present).

Lecturer, Case Western Reserve University (1-10 to present): Teaching General Physics I and II (calculus based) and Modern Physics.

Lecturer, Cleveland State University (1-04 to present): Teaching University Physics (calculus based), College Physics and Conceptual Physics; developed Mathcad programs for computer labs; published paper on relativistic visualization in American Journal of Physics.

Lecturer, Cuyahoga Community College (5-01 to 12-03): Taught College Physics, including labs; developed some new demonstrations.

President, The Ultimate Cosmic Toy Company, Inc. (12-96 to present): Manufacturing and marketing my invention, the Zube Tube; created a website for the Zube Tube.

Senior Research Scientist, AYT Corporation, NASA Lewis Research Center (3-95 to 12-96): Did research on combustion-acoustic oscillations and control of combustion-acoustic oscillations using neural networks.

Senior Research Associate, ICOMP, NASA-Lewis Research Center (11-90 to 10-93): Did research on nonlinear physics (see publications and invited lectures).

Researcher, Center for Nonlinear Studies, Los Alamos National Lab (8-88 to 11-90): Did research on nonlinear physics (see publications and invited lectures).

Postdoctoral Fellow, National Center for Atmospheric Research (8-86 to 8-88): Did research on nonlinear physics (see publications and invited lectures).

Researcher, Center for Nonlinear Studies, Los Alamos National Lab (8-84 to 7-86): Worked on Ph.D. thesis, did research on nonlinear physics (see publications and invited lectures).

Researcher, Institute for Advanced Study, Princeton (3-84 to 7-84).

Teaching Assistant, University of California, Santa Cruz (9-83 to 3-84).

Teaching Assistant, Univ. of Illinois, Urbana (1-79 to 5-80, except for one semester where I had a University Fellowship).

Teaching Assistant, Univ. of Illinois, Urbana (9-74 to 7-77, except for one semester where I had a University Fellowship).

Fellowships and Patents

Advanced Study Program Postdoctoral Fellowship at NCAR, 8-86 to 8-88.

Out of State Tuition Fellowship for first year at Santa Cruz.

University Fellowship for two semesters at Univ. of Illinois.

U.S. Patent No. 4,187,635 (1980) Method and apparatus for sound production.

Invited Lectures

Seminar at Case Western Reserve University, February 23, 2009.

Seminar at Cleveland State University, October 16, 2003.

Seminar at Center for Nonlinear Studies, Los Alamos National Lab, 4-98.

The Fourth Tsukuba International Workshop on Chaos/Turbulence, University of Tsukuba, Japan, November 5-7, 1996.

Seminar at Ohio University, Condensed Matter Seminar Series, May 4, 1994.

Fluctuations and Order: The New Synthesis, *Review Lecture on Noise-Sustained Structure*, Los Alamos National Laboratory, September 9-12, 1993.

Eighth International Couette-Taylor Meeting, Spatio-Temporal Properties of Centrifugal Instabilities, Nice, France, March 29-31, 1993.

International Symposium on Spatio-Temporal Structure and Chaos in Heat and Mass Transfer Processes, Athens, Greece, May 21-23, 1992

Second International Symposium on Turbulence and Chaos, University of Tsukuba, Japan, January 16-17, 1992.

KIT International Workshop, Physics of Pattern Formations in Complex Dissipative Systems, Kitakyushu, Japan, September 18-20, 1991.

NATO Advanced Research Workshop, The Global Geometry of Turbulence, Impact of Non-linear Dynamics, Rota, Spain, July 8-14, 1990.

International Workshop on Patterns, Defects, and Materials Instabilities, NATO Advanced Study Institute, Cargese (Corsica), September 4-15, 1989.

Workshop on Binary-Mixture Convection, UCLA Conference Center at Lake Arrowhead, May 19-21, 1989.

Seminar at Ohio State University, February 16, 1989.

Seminar at University of Texas at Austin, November 28, 1988.

International Conference on External Noise and its Interaction with Spatial Degrees of Freedom in Nonlinear Dissipative Systems, Los Alamos National Lab, March 28-31, 1988.

Seminar at Colorado State University, October 1986.

Seminar at National Center for Atmospheric Research, Boulder, CO, Apr. 1986.

International Workshop on Dimensions and Entropies in Chaotic Systems, Pecos River Ranch, New Mexico, Sept. 1985 (Hosted by Los Alamos National Lab).

International Conference on Solitons and Coherent Structures, University of California at Santa Barbara, Jan. 1985.

Publications

R. J. Deissler, “Dipole in a Magnetic Field, Work, and Quantum Spin”, *Phys. Rev. E* **77** (2008) 036609.

R. J. Deissler, “The Appearance, Apparent Speed, and Removal of Optical Effects for Relativistic Objects”, *Am. J. Phys.* **73** (2005) 663.

R. J. Deissler and H. R. Brand, “The Effect of Nonlinear Gradient Terms on Breathing Localized Solutions in the Complex Ginzburg-Landau Equation”, *Phys. Rev. Lett.* **81** (1998) 3856.

H. R. Brand and R. J. Deissler, “Transition from Propagating Localized States to Spatiotemporal Chaos in Phase Dynamics”, *Phys. Rev. E* **58** (1998) R4064.

H. R. Brand and R. J. Deissler, “Pattern Formation Near an Oscillatory Instability for Systems without ‘Up-down’ Symmetry”, *Phys. Lett. A*, **231** (1997) 179.

A. Oron, R. J. Deissler, and J. C. Duh, “Marangoni Instability in a Liquid Layer with Two Free Surfaces”, NASA Technical Memorandum 106166, *Eur. J. Mech. B/Fluids* **14** (1995) 737.

A. Oron, R. J. Deissler, and J. C. Duh, “Marangoni Instability in a Liquid Sheet”, *Advances in Space Research* **16** (1995) (7)83-(7)86.

R. J. Deissler and H. R. Brand, “Interaction of Breathing Localized Solutions for Subcritical Bifurcations”, *Phys. Rev. Lett.* **74** (1995) 4847.

H. R. Brand and R. J. Deissler, “Stable Spatially Localized Solutions and Holes in Optical Bistability” *Physica* **216A** (1995) 288.

R. J. Deissler and H. R. Brand, “Two-dimensional Localized Solutions for Subcritical Bifurcations in Systems with Broken Rotational Symmetry” *Phys. Rev. E* **51** (1995) R852.

A. Oron, R. J. Deissler, and J. C. Duh, “Marangoni Instability in a Liquid Sheet with Deformable Interfaces”, Fourteenth IMACS World Congress on Computational and Applied Mathematics, 1994, Vol. 2, 864.

R. J. Deissler, “Thermally-Sustained Structure in Convectively Unstable Systems”, *Phys. Rev.* **49E** (1994) R31.

R. J. Deissler and H. R. Brand, “Periodic, Quasiperiodic, and Chaotic Localized Solutions of the Quintic Complex Ginzburg-Landau Equation”, *Phys. Rev. Lett.* **72** (1994) 478.

H. R. Brand and R. J. Deissler, “Stable Localized Solutions in Nonlinear Optics”, *Physica* **204A** (1994) 87.

- H. R. Brand and R. J. Deissler, “Propagating Confined States in Phase Dynamics”, *Phys. Rev.* **46A** (1992) 888.
- R. J. Deissler and A. Oron, “Stable Localized Patterns in Thin Liquid Films”, NASA Technical Memorandum 105352, *Phys. Rev. Lett.* **68** (1992) 2948.
- H. R. Brand and R. J. Deissler, “The Eckhaus and the Benjamin-Feir Instability Near a Weakly Inverted Bifurcation”, NASA Technical Memorandum 105334, *Phys. Rev.* **45A** (1992) 3732.
- R. J. Deissler and J. D. Farmer, “Deterministic Noise Amplifiers”, *Physica* **55D** (1992) 155.
- R. J. Deissler and H. R. Brand, “Interaction of Two-Dimensional Localized Solutions near a Weakly Inverted Bifurcation”, *Phys. Rev.* **44A** (1991) 3411.
- H. R. Brand, R. J. Deissler, and G. Ahlers, “Simple Model for the Benard Instability with Horizontal Flow Near Threshold”, *Phys. Rev.* **43A** (1991) 4262.
- R. J. Deissler, A. Oron, and Y. C. Lee, “Evolution of Two-Dimensional Waves in Externally Perturbed Flow on a Vertical Cylinder”, *Phys. Rev.* **43A** (1991) 4558.
- R. J. Deissler, Y. C. Lee, and H. R. Brand, “Confined States in Phase Dynamics: The Influence of Boundary Conditions and Transient Behavior”, *Phys. Rev.* **42A** (1990) 2101.
- H. R. Brand and R. J. Deissler, “Properties of Confined States in Phase Dynamics”, *Phys. Rev.* **41A** (1990) 5478.
- R. J. Deissler and H. R. Brand, “The Effect of Nonlinear Gradient Terms on Localized States Near a Weakly Inverted Bifurcation”, *Phys. Lett.* **146A** (1990) 252.
- H. R. Brand and R. J. Deissler, “The Interaction of Localized Solutions for Subcritical Bifurcations”, *Phys. Rev. Lett.* **63** (1989) 2801.
- T. S. Sullivan and R. J. Deissler, “Elimination of Hysteresis in a System of Coupled Ginzburg-Landau Equations”, *Physical Review* **40A** (1989) 6748.
- H. R. Brand and R. J. Deissler, “Confined States in Phase Dynamics”, *Phys. Rev. Lett.* **63** (1989) 508.
- R. J. Deissler, “External Noise and the Origin and Dynamics of Structure in Convectively Unstable Systems”, *J. Stat. Phys.* **54** (1989) 1459.
- H. R. Brand and R. J. Deissler, “Noise-Sustained Structures in the Kuramoto-Sivashinsky Equation”, *Physical Review* **39A** (1989) 462.

R. J. Deissler and H. R. Brand, “Generation of Counterpropagating Nonlinear Interacting Traveling Waves by Localized Noise”, *Physics Letters* **130A** (1988) 293.

R. J. Deissler, “The Convective Nature of Instability in Plane Poiseuille Flow”, *Physics of Fluids* **30** (1987) 2303.

R. J. Deissler, R. Ecke, and H. Haucke, “Universal Scaling and Transitory Behavior of Temporal Modes Near a Hopf Bifurcation: Theory and Experiment”, *Physical Review* **36A** (1987) 4390.

R. J. Deissler, “Turbulent Bursts, Spots, and Slugs in a Generalized Ginzburg-Landau Equation”, *Physics Letters* **120A** (1987) 334.

R. J. Deissler, “Spatially-Growing Waves, Intermittency, and Convective Chaos in an Open Flow System”, *Physica* **25D** (1987) 233.

R. J. Deissler and K. Kaneko, “A Measure of Chaos for Open Flow Systems”, in: *Dimensions and Entropies in Chaotic Systems*, Editor: G. Mayer-Kress (1986).

R. J. Deissler and K. Kaneko, “Velocity-Dependent Liapunov Exponents as a Measure of Chaos for Open Flow Systems”, *Physics Letters* **119A** (1987) 397.

R. J. Deissler, “Noise-Sustained Structure, Intermittency, and the Ginzburg-Landau Equation”, *J. Stat. Phys.* **40** Nos. 3/4 (1985) 371.

R. J. Deissler, “One-Dimensional Strings, Random Fluctuations, and Complex Chaotic Structures”, *Physics Letters* **100A** (1984) 451.

References

By request.