CURRICULUM VITAE

Dr. Sten Rüdiger

Theoretical physics, SF5
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Education

Ph.D., physics, Universität Potsdam, Germany
- Oct. 1, 1996 to Sept. 30, 2000
- degree "magna cum laude" (July 6, 2000)
- thesis: Instabilities and pattern formation in hydrodynamical and magneto-hydrodynamical systems

Diploma, mathematics and physics, Freie Universität Berlin, Germany
- Apr. 1, 1990 to Sept. 30, 1996, degrees:
- prediploma (Oct. 26, 1993)
- diploma (July 18, 1996)
- thesis: Symmetry-breaking bifurcations of the magneto-hydrodynamic equations

Research interests

- pattern formation, statistical physics
- mathematical physiology
- dynamical systems theory
- computational methods

Research experience

Hahn-Meitner Institut, Berlin, since Dec 2004
- modelling and simulation of intracellular calcium waves
- implementation of a finite element solver for spatio-temporal biochemistry

Department of Physics, Universität Bayreuth, research assistant with L. Kramer †, Oct 2003 to Nov 2004
- regeneration process in Hydra
- Turing structures under forcing in form of a traveling wave

School of Computational Science and Information Technology, Florida State University, Tallahassee, USA, postdoctoral appointment from Sep 2001 to Sep 2003, with J. Viñals
- rheology of block copolymers and orientational effects of shear
- mean-flow effects on the stability of Faraday waves

Department of Physics and Astronomy, University of Pittsburgh, USA, visiting scholar from Sep 2001 to Jul 2002, with D. Jasnow
- visco-elastic properties of block copolymers

Department of Physics, Universitat de Barcelona, Spain, postdoctoral appointment from the EU-network program "Patterns, noise and chaos" from Oct 2000 to Aug 2001, with J. Casademunt
- Turing patterns with spatio-temporal forcing; close collaboration to perform chemical experiments in Santiago, Spain
- transition to chaos in natural convection

Department of Physics, Universität Potsdam, Germany, assistant researcher from Oct 1996 to Sep 2000, with J. Kurths, F. Feudel, N. Seehafer
- symmetry-breaking bifurcations in the magneto-hydrodynamic equations
- Rayleigh-Bénard convection in a cylinder
- theory of symmetry breaking bifurcations and dynamical systems

University of California, Berkeley, USA, research scholar from Nov 1998 to Apr 1999, with E. Knobloch
- Rayleigh-Bénard convection in a rotating cylinder

Max-Planck-group on Nonlinear Dynamics, Potsdam, Germany, student research contract from Mar 1995 to Sep 1996
- group-theoretical methods in bifurcation analysis

Awarded grant

DAAD grant: research program at University of California, Berkeley, from Nov 1998 to Apr 1999

Academic experience

Problem course on **hydrodynamics**, Universität Bayreuth, 2004

Lecture course on **nonequilibrium thermodynamics** (in English), Universität Bayreuth, 2003/2004

Problem course on **pattern formation in hydrodynamical systems**, Universität Potsdam, 2000

Summer school on **nonlinear dynamics**, Center of Nonlinear Dynamics, Universität Potsdam, 2000

Publications in refereed journals

J. Soriano, S. Rüdiger, A. Ott, Experiments and reaction-diffusion model for Hydra symmetry-breaking, in prep.

M. Falcke, S. Rüdiger, Period distributions of intracellular Ca^{2+} oscillations, to be subm. to Biophys. J.

S. Rüdiger, L. Kramer, The imperfect Ising-Bloch transition in spatio-temporally forced systems, to be subm. to Phys. Rev. Lett.

S. Rüdiger, E.M. Nicola, J. Casademunt, Spatio-temporal forcing of Turing patterns, to be subm to Phys. Rep.

I. Mercader, X. Ruiz, O. Batiste, S. Rüdiger, L. Ramírez-Piscina, J. Casademunt, Bifurcations and chaos in single-roll natural convection with low Prandtl number, Phys. Fluids 17, 104108 (2005)

S. Rüdiger, J. Casademunt, L. Kramer, Kinks in pattern forming systems under traveling-wave forcing, Discr. Cont. Dyn. Sys. B 5, 1027 (2005)

S. Rüdiger, Viscoelastic response of block copolymers to oscillatory shear, Eur. Phys. J. E 17 (2005) 45

J.M. Vega, S. Rüdiger, J. Viñals, A phenomenological model of weakly damped Faraday waves and the associated mean flow, Phys. Rev. E 70 (2004), 046306

S. Rüdiger, E. Knobloch, Mode interaction in rotating Rayleigh-Bénard convection, Fluid Dynamics Research 33 (2003), 477

F. Feudel, M. Gellert, S. Rüdiger, A. Witt, N. Seehafer, Dynamo effect in a driven helical flow, Phys. Rev. E 68 (2003), 046302

S. Rüdiger, D. Gómez-Míguez, A.P. Muñuzuri, F. Sagués, J. Casademunt, Dynamics of Turing patterns under spatio-temporal forcing, Phys. Rev. Lett. 90 (2003), 128301 (also Virtual Journal of Biological Physics, 5, 7 (2003))

S. Rüdiger, F. Feudel, Pattern formation in Rayleigh-Bénard convection in a cylindrical container, Phys. Rev. E 62 (2000), 4927

S. Rüdiger, F. Feudel, N. Seehafer, Dynamo bifurcations in an array of driven convection-like rolls. Phys. Rev. E 57 (1998), 5533

F. Feudel, N. Seehafer, B. Galanti, S. Rüdiger, Symmetry breaking bifurcations for the magnetohydrodynamic equations. Phys. Rev. E 54 (1996), 2589

Book chapters and other publications

S. Rüdiger, J.M. Vega, Model equations for weakly damped Faraday waves, in: Lecture notes on Dynamics and Bifurcation of Patterns in Dissipative Systems, Edited by G. Dangelmayr, I. Oprea, World Scientific Series on Nonlinear Sciences, Series B, World Scientific, 2004

X. Ruiz, S. Rüdiger, L. Ramírez-Piscina, J. Casademunt, Chaotic response of small Prandtl number fluids to low gravity in differentially heated cavities, Proceedings of IAF'2001: 52nd International Astronautical Congress, Toulouse, France, 2001

F. Feudel, S. Rüdiger, A. Witt, M. Gellert, Lagrangian chaos and dynamo effect in magnetohydrodynamics, in: EQUADIFF99, International Conference on Differential Equations Berlin 1999, Edited by B. Fiedler, K. Gröger, J. Sprekels, Vol. 2, 1275-1277, World Scientific 2000

F. Feudel, S. Rüdiger, N. Seehafer, Bifurcation phenomena and dynamo effect in electrically conducting fluids, in: Ergodic Theory, Analysis, and Efficient Simulation of Dynamical Systems, Edited by B. Fiedler, 2000

References

Dr. M Falcke, falcke@hmi.de, Hahn-Meitner Institut, Dept SF5, Glienicker Str. 100, 14109 Berlin, Germany

Professor J. Viñals, vinals@physics.mcgill.ca, Department of Physics, McGill University, 3600 University St., Montreal, QC H3A 2T8, Canada

Professor J. Casademunt, jaume@ecm.ub.es, Facultat de Fisica, Dept. E.C.M., Av. Diagonal, 647, E-08028 Barcelona, Spain

Professor J. Kurths, juergen@agnld.uni-potsdam.de, Institut für Physik, Universität Potsdam, PF 601553, D-14415 Potsdam, Germany

Professor D. Jasnow, jasnow+@pitt.edu , Department of Physics and Astronomy, University of Pittsburgh, 3941 O'Hara Street, Pittsburgh, PA 15260, USA