Yuan-Nan Young

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49 Howard Court
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Citizenship Taiwan, United States Permanent Resident

Employment

Dept. of Mathematical Sciences, NJIT
Assistant Professor — Sep. 2004 - Current

Center for Turbulence Research, Stanford University
Postdoctoral Fellow — Sep. 2002 - Aug. 2004

Engineering Sciences and Applied Math, Northwestern University
Postdoctoral Fellow — Sep. 2000 - Aug. 2002

ASCI/FLASH Center, University of Chicago
Postdoctoral Research Associate — March-September, 2000

Department of Physics, National Taiwan University
Instructor — Sep. 1993 - Aug. 1994

Education

University of Chicago, Chicago, IL
Ph.D. in Astronomy and Astrophysics — March, 2000

University of Chicago, Chicago, IL
M.Sc. in Astronomy and Astrophysics — March, 1996
Enrolled in Fall, 1994. Ph.D. candidate in Fall, 1995 with GPA 3.9/4.0

National Taiwan University, Taipei, Taiwan
B.Sc. in Physics — June, 1993
Enrolled in Fall, 1989. GPA 3.7/4.0

Fellowship and award

Postdoctoral Fellowship
Center for Turbulence Research, Stanford University — Sep. 2002 - Aug. 2004

Lectureship
Engineering Sciences and Applied Mathematics, Northwestern University — Fall, 2001

Geophysical Fluid Dynamics Fellowship
GFD Summer Program, Wood Hole Oceanographic Institution — Summer, 1999

Book Awards for Top 5% Undergraduate Students
National Taiwan University 1990

Program

Visiting Staff - Geophysical Fluid Dynamics Summer Program, Woods Hole Oceanographic Institution June-July, 2002

Visiting Student - IGPP (Institute of Geophysical and Planetary Physics)
Lawrence Livermore National Lab July-October, 1998

Visiting Student - Geophysical Fluid Dynamics Summer Program
Woods Hole Oceanographic Institution June-July, 1998

Visiting Student - Physics Department
Academic Sinica, Taiwan June-August, 1992

Research experience

Hybrid level set methods: particle level set method, level set with VOF method, and application of level set methods to image processing and medical image segmentation

Fluid dynamics: multi-scale analysis, matched asymptotics, Floquet analysis and stability analysis, simulations of incompressible turbulent flows, particle level set method in multi-phase turbulent flow, sub-grid scale modeling in stratified turbulence, particle-laden turbulence

Complex systems: pattern formation and defect chaos, particle method for chaotic mixing

Computing Experience

• **Programming:** Fluent in C, Fortran 77, Fortran 90, MPI (Massage Passing Interface), IDL (Interactive Data Language), Maple, Mathematica and LaTeX.

• **Parallel Computing:** Experience with various high-performance parallel computers such as the 256-processor T3E Cray at PSC (Pittsburgh Supercomputing Center), SGI Origin 3000 and 2000 clusters at NASA/Ames, 98-processor SGI Origin 2000 at Argone National Labs and the 256-processor HP blue horizon at SDSC (San Diego Supercomputing Center).

Refereed Journal Publications (* first author)

1 "Stratified Kolmogorov Flow: Part II"
Journal of Fluid Mechanics, accepted, to appear in 2005 *with N. Balmforth*

*2** "Registration-Based Morphing of Active Contours for Segmentation of CT Scans"
Mathematical Biosciences and Engineering 2 (1) pp 79-96, 2005 *with D. Levy*

3 "A comparative study of the turbulent Rayleigh-Taylor instability using high-resolution 3D numerical simulations: The Alpha-Group collaboration"
Physics of Fluids 16 (5) pp 1668-1693, 2004 *with G. Dimonte and the alpha-group*

4 "Weakly non-linear analysis of wind-driven gravity waves"
Journal of Fluid Mechanics 503 171, 2004 *with A. Alexakis and R. Rosner*

5 "A hybrid Eulerian-Lagrangian method for LES of atomising spray"
Advances in Fluid Mechanics 37 313, 2004 *with F. Ham, S. Apte and M. Herrmann*

*6** "Whirling and defect chaos in non-Boussinesq convection"
New Journal of Physics 5 135.1-135.16, 2003 *with H. Riecke and W. Pesch*

*7**. "Penta-hepta defect chaos in a model for rotating hexagonal convection"
Physical Review Letters 90 134502, 2003 *with H. Riecke*

*8**. "Induced defect nucleation and side-band instabilities in hexagons with rotation and mean flow"
Physica D 176 pp 107-124, 2003 *with H. Riecke*

9. "Universality of scalar statistics in stably stratified turbulence",
Physical Review E 66 016306, 2002 *with S. Wunsch*

*10**. "Mean flow in the hexagonal convection: stability and nonlinear dynamics"
Physica D 163 pp 166-183, 2002 *with H. Riecke*

11. "Shear instability of fluid interfaces: Stability analysis"
Physical Review E 65 026313, 2002 *with A. Alexakis and R. Rosner*

12. "Stratified Kolmogorov flow"
Journal of Fluid Mechanics 450 pp 131-167, 2002 *with N. Balmforth*

13. "On the C/O Enrichment of Novae Ejecta"
Astrophysical Journal Letters 562 pp L177-L179, 2001 *with R. Rosner, A. Alexakis, J. Truran and W. Hilderbrandt*

*14**. "On the miscible Rayleigh-Taylor instability: two and three dimensions"
Journal of Fluid Mechanics 447 pp 377-408, 2001 *with H. Tufo, A. Dubey and R. Rosner*

15. "Flash code: Studying astrophysical thermonuclear flashes"
Computing in Science and Engineering (AIP) 2, pp 33-41, 2000 *with R. Rosner and the FLASH team*

*16**. "Numerical simulation of double-diffusive convection in a rectangular box"
Physical Review E 61 pp 2676-2694, 2000 *with R. Rosner*

*17**. "Linear and Weakly nonlinear analysis of doubly diffusive vertical slot convection"
Physical Review E 57 pp 5554-5563, 1998 *with R. Rosner*

*18**. "Linear stability analysis of doubly-diffusive vertical slot convection"
Physical Review E 57 pp 1183-1186, 1998 *with R. Rosner*

Submitted papers

1. Young, Y.-N.
Ham, F., Riemer, N. ,Herrmann, M. and Cristini, V.
"Drop size distribution in turbulent two-phase flows",
submitted to **Physics of Fluids**

General Publications

1. Young, Y.-N., Ferziger, J., Ham, F. and Herrmann, M.
"Turbulent mixing of multiphase flows"
CTR Annual Review Brief 2003

2. Young, Y.-N., Miesch, M. and Mansour, N. N.
"Subgrid scale modeling in solar convection simulations using ASH"
CTR Annual Review Brief 2003

3. Ham, F. and Young, Y.-M.
"A Cartesian adaptive level set method for two-phase flows"
CTR Annual Review Brief 2003

4. Young, Y.-N., Apte, S., Ham, F., Mansour, N. and Herrmann, M. "Transition from Eulerian to Lagrangian description of multiphase flows using the particle level set method"
ILASS Americas 15th annual conference on liquid atomization and spray systems, Monterey, CA May 2003 May, 2003

5. Young, Y.-N., Ham, F. and Mansour, N.
"Interaction between turbulent flow and free surfaces"
CTR Annual Review Brief, 2002 December, 2002

6. Young, Y.-N. and Balmforth, N. "Stratified Kolmogorov flow"
Proceedings of the 12th Taylor-Couette Conference September, 2001

7. Young, Y.-N.
"Numerical simulation of double-diffusive convection and miscible Rayleigh-Taylor instability" (PhD dissertation) **University of Chicago press** March, 2000

8. Young, Y.-N. "On Stratified Kolmogorov flow"
Woods Hole Oceanographic Institution Tech Report, WHOI-2000-07.
October, 2000

9. Young, Y.-N., Tufo, H., Dubey, A. and Rosner, R.
"On the miscible Rayleigh-Taylor instability: 2D versus 3D"
Proceedings of the 2000 ICTAM meetings at Chicago ISSN 0073-5264, No. 950.
September, 2000

10. ASCI/FLASH astro and code groups
"Connecting Astrophysics to Laboratory Fluid Dynamics: Astrophysical Thermonuclear Flashes", Invited paper in **American Institute of Aeronautics and Astronautics (AIAA)**, 99-3649 (A99-33671) 1999

Work in progress

1. with Mike Siegel et al.
"Effects of surfactants on pinch-off", in preparation.

2. with Dan Goldman and V. Cristini et al.
"Oxygen (nutrient) transport in tumor growth: simulations and modeling", in preparation.

Teaching

INSTRUCTOR, M614 Numerical Methods I
Department of Mathematical Sciences,
NJIT, Newark, NJ — Winter, 2005

INSTRUCTOR, M337 Linear Algebra
Department of Mathematical Sciences,
NJIT, Newark, NJ — Autumn, 2004

INSTRUCTOR, Review Calculus for Engineering Freshmen
Department of Engineering Sciences and Applied Mathematics,
Northwestern University, Evanston, IL — Autumn, 2001

TEACHING ASSISTANT, Natural Sciences 101 (Freshman level astronomy)
Department of Astronomy and Astrophysics,
University of Chicago, Chicago, IL — Autumn, 1997

TEACHING ASSISTANT, Physical Sciences 101, 102, 103 (Freshman level astronomy)
Department of Astronomy and Astrophysics,
University of Chicago, Chicago, IL — 1994-1995

INSTRUCTOR, Experimental Modern Physics (Junior level physics)
Department of Physics, National Taiwan University, Taipei, Taiwan — 1993-1994

Professional Societies and Activities

• Society
American Physical Society
Society of Industrial and Applied Mathematics
• Reviewer
Journal of Fluid Mechanics
Physical Review E
Physical Review Letters
Journal of Geophysical and Astrophysical Fluid Dynamics
Canadian Journal of Physics
Georgian-US inter-government funding

Selected Presentations (from Dec 1998 **to Nov** 2004**)**

• Dept. of Mechanical Engineering, NJIT, "Drop size distribution in turbulent two-phase flows", Oct, 2004

• Dept. of Mathematical Sciences, NJIT, "Mixing of two fluids: from an interfacial instability to bubble(drop) dynamics in turbulence", March, 2004

• Dept. of Mathematics, University at Buffalo, SUNY, "Particle level set method in CFD and image processing", November, 2003

• APS (American Physical Society)/DFD (Division of Fluid Dynamics) 56th annual meeting, "Turbulent mixing of multiphase flow", November, 2003

• APS/DFD 56th annual meeting, "Cell-laden blood flow in the artery", November, 2003

• APS/DFD 56th annual meeting, "Sub-grid scale modeling in solar convection simulations using ASH", November, 2003

• Computation in Science seminar at the University of Chicago, "Application of a hybrid level method to image processing and mixing of multiphase flow", August, 2003

• IGPP-IPAM/UCLA worksohp, "Sub-grid scale modeling in an-elastic solar convection simulations", July, 2003

• ILASS2003, "Transition from Eulerian to Lagrangian description of multiphase flow using the particle level set method", May, 2003

• Seventh SIAM Snowbird conference, "Statistics of levels in turbulent flow", May, 2003

• APS/DFD 55th annual meeting, "Penta-hepta defect chaos in a model for rotating convection with mean flow", November, 2002

• Center for Turbulence Research Seminar, Stanford University, "Wind-driven gravity waves: instability, weakly non-linear analysis and mixing properties", November, 2002

• Woods Hole Oceanographic Institution (WHOI), Mini symposium on rotating convection, "Penta-hepta defect chaos in non-Boussinesq rotating convection at low Prandtl numbers", July, 2002

• Dept. of Mathematics, University at Buffalo, SUNY, "Pattern formation and non-linear dynamics in fluid mechanics", December, 2001

• APS/DFD 54th annual meeting, "Mean flow in hexagonal convection: stability and nonlinear dynamics", November, 2001

• Sixth SIAM Snowbird conference, "Mean flow in hexagonal convection: stability and nonlinear dynamics", May, 2001

• Dept. of Applied Mathematics and Statistics, State University of New York, Stony Brook, "On the miscible Rayleigh-Taylor instability", February, 2001

• APS/DFD 53rd annual meeting, "Dynamics of internal boundary layers in stratified Kolmogorov flow", November, 2000

• APS/DFD 53rd annual meeting, "DNS of wind-driven breaking waves", November, 2000

• Computations in Science Seminars, Department of Physics, University of Chicago, "Stratified Kolmogorov Flow", September, 2000

• International Congress of Theoretical and Applied Mechanics (ICTAM) 2000 Meeting, " Miscible Rayleigh-Taylor instability: 2D versus 3D", September, 2000

• American Astronomical Society, 196th Meeting, Thesis presentation, "Miscible Rayleigh-Taylor Instability: 2D versus 3D", June, 2000

• Dept. of Applied Mathematics and Statistics, State University of New York, Stony Brook, "On stratified Kolmogorov flow", May, 200

• 3rd International Conference on Laboratory Astrophysics with Intense Laser, "Miscible Raleigh-Taylor Instability: 2D versus 3D", March, 2000

• APS/DFD 52nd annual meeting, "On the miscible Rayleigh-Taylor Instability: 2D versus 3D", November, 1999

• APS/DFD 52nd annual meeting, "On stratified Kolmogorov shear flow", November, 1999

• Computational and Applied Math/Nonlinear PDEs Seminars, Department of Mathematics, University of Chicago, "Stratified Kolmogorov shear flow", September, 1999

• Computational and Applied Math/Nonlinear PDEs Seminars, Department of Mathematics, University of Chicago, "Layer dynamics in doubly-diffusive convection ", December, 1998

References

Prof. Robert Rosner, r-rosner@uchicago.edu, (773) 702-0560
Department of Physics and Department of Astronomy and Astrophysics
University of Chicago

Prof. Hermann Riecke, h-riecke@northwestern.edu, (847) 491-3345, (847) 491-8316
Department of Engineering Sciences and Applied Mathematics,
Northwestern University

Prof. Todd Dupont, dupont@cs.uchicago.edu, (773) 702-3485
Department of Computer Science and Department of Mathematics,
University of Chicago

Prof. Doron Levy, dlevy@math.stanford.edu, (650) 723-4157
Department of Mathematics,
Stanford University

Prof. Neil J. Balmforth, njb@cse.ucsc.edu
Department of Applied Maths and Statistics, School of Engineering
University of California, (831) 459-3753