X. San Liang

Summary

° Introduced the concept of *scale window*, and invented a new mathematical machinery, *multiscale window transform*, for the challenging multiscale atmosphere/ocean/climate problems.

° Systematic work on multiscale fluid dynamics, including *mean-eddy-turbulence interaction, canonical transfer, localized hydrodynamic stability,* etc., for the understanding and quantification of the complex nonlinear dynamical processes within realistic atmospheric/oceanic flows and the emergence of coherent structures on different scales such as eddies and cyclones.

° Systematic work on formalization and quantification of *information flow* (and predictability/causality) within dynamical systems, a fundamental notion in general physics which has applications in the diverse disciplines such as atmosphere/ocean/climate science, neuroscience, turbulence, economics, material science, biological/computer network studies, nanotechnology, etc.

° Trained in both science and engineering. Strong multidisciplinary background in Atmosphere-ocean science, applied mathematics, and engineering science.

° Three years of sea-going survey experience; half a year of Antarctic adventure.

° Extensive experience of numerical simulation; a variety of ocean models built since early 90s.

Education

° **Harvard University** ***Ph.D.*** in **Applied Mathematics** GPA: 3.92 out of 4 2002

° **Harvard University** ***S.M.*** in **Applied Mathematics** GPA: 3.92 out of 4 1998

° **State Oceanic Administration (China)** ***M.S.*** in **Physical Oceanography** 1991

° **National University of Defense Technology (China)** ***B.E.*** in **Aerospace Engineering** 1988

Major Academic Honors and Awards

° Stanford University - NASA Ames Nat'l Lab: *CTR Research Fellowship* 2004

° Harvard University: *Ernst Habicht Fellowship of Excellence* 1997 - 1998

Employment History

° China Institute for Advanced Study (CIAS) *Professor* 2008 –

° Central University of Finance & Economics (CUFE) (CIAS Professors are CUFE Tepin Professors)

° State Key Lab of Satellite Ocean Env. Dyn., China *Tepin Adjunct Scientist* 2008 –

° Courant Institute of Mathematical Sciences, NY *Principal Investigator Res. Scientist* 2007 –

° Courant Institute of Mathematical Sciences, NY *Research Scientist* 2005 –2007

° Harvard University: *Honorary Associate Scientist* 2005 –2006

° Stanford University - NASA Ames Research Lab: *Visiting Scholar* 2004

° Harvard University: *Postdoctoral Fellow* 2002 - 2004

° Harvard University: *Research Assistant* 1996 - 2002

° State Oceanic Administration (2nd Inst), Lab or Marine Modelling (China): *Assist. Researcher* 1993 - 95

° Chinese Antarctic Research Expedition (CHINARE #9): *Hydrographic Survey Team Leader* 1992 - 93

° State Oceanic Administration (2nd Inst), Dept Polar Research (China): *Assist. Researcher* 1991 - 92

Service Activities

° Chair: AGU conference meeting session December 8 - 12, 2003

° Reviewer: *J. Fluid Mech., J. Phys. Oceanogr., Tellus, Nonlin. Progr. Geophys., J. Atmos. & Oceanic Tech.,J. Atmos. Sci., Adv. Water Resourc., etc.*

° Deputy Director, Experts Committee, Hong Kong BH Environment Consultants Corp., Ltd. 2002 - 2003

Immigration Status: U.S. Permanent Resident

Professional Memberships: ° SIAM ° Amer. Geophys. Union ° Amer. Meterol. Soc.

Major Seminars

° Princeton, NJ	° Courant Institute, NY	° WHOI, MA	° U of Rhode Island, RI
° Columbia, NY	° Caltech/JPL, CA	° Old Dominion U, VA	° HKUST, Hong Kong
° Stanford, CA	° UCSD/Scripps, CA	° Florida State U, FL	° U Mass - Dartmouth, MA
° MIT, MA	° Rutgers U, NJ	° U of Delaware, DE	° NC State U, NC

References

° Prof. Allan R. Robinson	(Geophys. Fluid Dyn.)	(617) 495-2819	robinson@pacific.harvard.edu
° Prof. Richard Kleeman	(Mathematics/Atmos. Sci.)	(212) 998-3233	kleeman@cims.nyu.edu
° Prof. Donald G. Anderson	(Applied Math)	(617) 495-3994	swelby@seas.harvard.edu (secretary)
° Dr. Kenneth H. Brink	(Phys. Oceanogr.)	(508) 289-2535	kbrink@whoi.edu
° Dr. Arthur J. Miller	(Climate Science)	(858) 543-8033	ajmiller@ucsd.edu
° Prof. A. Denny Kirwan	(Phys. Ocean Sci. & Engr.)	(302) 831-2977	adk@udel.edu
° Prof. Pierre Lermusiaux	(Mech. Engineering)	(617) 324-5172	pierrel@mit.edu

Representative Publications

[1] **Liang, X. San**, and A.R. Robinson, 2009: Multiscale processes and nonlinear dynamics of the circulation and upwelling events off Monterey Bay. *J. Phys. Oceanogr.*, 39, No. 2, 290-313.

[2] **Liang, X. San**, 2008: Information flow within stochastic dynamical systems. *Phys. Rev. E*. 78, 031113.

[3] **Liang, X. San**, and D. Anderson, 2007: Multiscale window transform. *SIAM J. Multiscale Model. Simul.*, Vol. 6, Issue 2, 437-467.

[4] **Liang, X. San**, and Richard Kleeman, 2007: A rigorous formalism of information transfer between dynamical system components. I. Discrete mapping. *Physica D*, 231, 1-9.

[5] **Liang, X. San**, and Allan Robinson, 2005: Localized multiscale energy and vorticity analysis. I. Fundamentals. *Dyn. Atmos. Oceans*, 38, 195-230.

[6] **Liang, X. San**, and Richard Kleeman, 2005: Information transfer between dynamical system components. *Phys. Rev. Lett.*, 95, 244101.

[7] **Liang, X. San**, and Allan Robinson, 2004: A study of the Iceland-Faeroe Frontal variability with the multiscale energy and vorticity analysis. *J. Phys. Oceanogr.*, Vol. 34, 2571-2591.