

High Performance Computing
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Education

- Dec 2004 - Ph.D. in Physics, Louisiana State University

Dissertation Title: Nonlinear Development of the Secular Bar-mode Instability in Rotating Neutron stars

Advisor: Joel Tohline

- May. 2004 - M.S. in System Science, Department of Computer Science, Louisiana State University

Advisor: John Tyler

- Dec 2001 - M.S. in Physics, Louisiana State University
- Jul 1995 - B.S. in Astronomy, Nanjing University, Nanjing, China

Professional Experience

- Aug 2006 - present, Scientific Application Consultant at High Performance Computing, Center for Computation and Technology, Louisiana State University. Major duties include: studying techniques and methods to improve performance of various application codes on HPC clusters with various architectures, such as Linux cluster, IBM Power 5 series; supporting and training users to use LSU HPC resources; performing partial system administration of Linux clusters and IBM P575 machines.
- Jul 2005 - Jul 2006, Postdoctoral Scholar at Department of Physics & Astronomy, Louisiana State University. Duties include: conducting research in computational astrophysics with emphasis on computational hydrodynamics; studying dynamical instabilities in nascent neutron stars and associated gravitational radiation; studying possible equilibrium configurations of inhomogeneous ellipsoidal fluid systems and associated instabilities, such as elliptical instability; coupling orbital dynamics and hydrodynamics to study disk-planet interaction as a mechanism for planet migration.
- Jan 2005 - Jun 2005, Postdoctoral Scholar at Center for Computation and Technology, Louisiana State University. Major duty is to port the LSU astrophysical fluid code to the CACTUS computational frame work developed by Ed Seidel's relativity group.
- Jan 2001 - Dec 2004, Graduate Research Assistant at Department of Physics & Astronomy, Louisiana State University. Using computational fluid dynamics to study the gravitational-radiation-driven secular bar-mode instability in rotating neutron stars, dynamical instabilities in post-bounce supernova cores.
- Aug 1999 - Dec 2000, Graduate Teaching Assistant at Department of Physics & Astronomy, Louisiana State University.
- Aug 1995 - Jul 1999, Mission Analyst Engineer at Division of Geo-Synchronous Communication Satellite, Beijing Institute of Spacecraft System Engineering. Using computational orbital dynamics to simulate orbital motions of Geo-synchronous satellites, designing an optimal orbital maneuver scenario to achieve minimum fuel consumption.

- Others: refereed for General Relativity and Gravitation, 2005.

Research Interests

Celestial mechanics: simulating orbital motion of artificial earth satellites through computational orbital dynamics, using the Runge-Kutta method to solve the equation of motion; studying disk/planet interaction as the origin of planet migration.

Star formation, stellar structure and stellar oscillations: secular and dynamical instabilities of rapidly rotating stars, dynamical instabilities in supernova core collapse, theory of compact objects, fission theory on the birth of close binary systems

Gravitational-wave Astronomy: gravitational waves from rotating neutron stars and core collapse of massive stars

Computational fluid dynamics, numerical techniques for solving PDES: developing numerical methods to solve the Navier-Stokes equation and Poisson's equation.

High performance parallel computing: experience in parallel programming with MPI and OpenMP, grid-computing applications with Globus, 3D visualization with OpenGL, IDL and Maya

Teaching Experiences

LONI High Performance Computing Workshop, Tulane University, New Orleans, March 2007
Instructor of Introduction to OpenMP Programming on LONI IBM P5s (including labs)

High Performance Computing Workshop, Louisiana State University, Jan 2007
Instructors of two lectures:

- (1) Compilers and Code Optimizations on Linux Clusters (including labs)
- (2) Profiling and Debugging on Linux Clusters

Dept. of Physics & Astronomy, Louisiana State University, Spring 2007
Instructor of informal lectures on Introduction to Linux Programming for Physics major graduate students

Dept. of Physics & Astronomy, Louisiana State University, Fall 1999 - Fall 2000
Teaching assistant to graduate-level Classical Mechanics, Quantum Mechanics, non-major undergraduate General Physics.
Major duties include grading and office hours for questions.

International Training Courses, Xi'an, China, June 1999
Instructor of Introduction to Orbital Mechanics of Artificial Satellites (three-day lectureship)

Publications

Refereed Journals:

- Astrophysics:

S. Ou, J. E. Tohline, P. Motl, 2007, *Further Evidence of an Elliptical Instability in Rotating Fluid Bars and Ellipsoidal Stars*, accepted by The Astrophysical Journal, astro-ph/0702750.

S. Ou, J. E. Tohline, 2006, *Unexpected Dynamical Instabilities in Differentially Rotating Neutron Stars*, The Astrophysical Journal, 651, 1068, astro-ph/0604099.

S. Ou, 2006, *An Approximate Solver for Riemann and Riemann-Like Ellipsoidal Configurations*, The Astrophysical Journal, 639, 549, astro-ph/0511047.

C. Ott, **S. Ou**, J. E. Tohline, A. Burrows, 2005, *One-armed Spiral Instability in a Slowly Rotating, Post-Bounce Supernova Core*, The Astrophysical Journal Letter, 625, L119.

S. Ou, J. E. Tohline, and L. Lindblom, 2004, *Nonlinear Development of the Secular Bar-mode Instability in Rotating Neutron Stars*, The Astrophysical Journal, 617, 490.

- Computing:

E. Ceyhan, P. Basuchowdhuri, T. Judeh, **S. Ou**, B. Estrade, and T. Kosar, 2007, Towards a Faster and Improved ADCIRC (ADvanced Multi-Dimensional CIRCulation) Model, to appear in Journal of Coastal Research.

Abstracts and Talks:

S. Ou, *Can a rotating football be stationary: Implication from Riemann S-type ellipsoids*, 2005, contributed talk at the 15th Midwest Relativity Meeting.

J. E. Tohline, I. Park, **S. Ou**, 2005, *Constructing Models of Contact Binaries and Rapidly Rotating Ellipsoids*, the 207th American Astronomical Society Meeting, 2005 AAS, 207, 1309

S. Ou, J. E. Tohline, *Hydrodynamic Instability in core collapse supernovae and differentially rotating neutrons stars*, 2005, 47th Annual Meeting of the Division of Plasma Physics, APS.

S. Ou, J. E. Tohline, and L. Lindblom, 2004, *Nonlinear Development of the Secular Bar-mode Instability in Rotating Neutron Stars*, the 8th Meeting of High Energy Astrophysics Division of American Astronomical Society, 8.0701.

Papers Pending and in Preparation:

S. Ou, J. Ji, L. Liu, X. Peng, 2006, *Simulations of Disk-Planet Interaction: Baroclinic Generation of Vortensity and Nonaxisymmetric Rossby-Wave Instabilities*, submitted to The Astrophysical Journal.

S. Ou, Y. Le, W. Even, J.E. Tohline, Astrophysical Grid-Computing Applications across LONI (Louisiana Optical Network Initiative) Network, in preparation.

Grants

2006, junior researcher travel grant granted by Institute of Pure and Applied Mathematics at University of California at Los Angeles to attend a conference on Grand Challenge Problems in Computational Astrophysics.

2003, graduate student travel grant granted by Center for Gravitational Physics at Penn State University to attend a graduate summer school in relativistic hydrodynamics.

Professional Society Membership

American Physical Society

American Astronomical Society

Technical Training

October, 2001, Linux Cluster Workshop hosted by National Center for Supercomputing Applications

July, 2003, International Graduate Summer School on Computational Relativistic Hydrodynamics, jointly hosted by Pennsylvania State University and University of British Columbia

Computer Skills

Language and Software: C & C++, FORTRAN 90 & FORTRAN 77, MPI, OpenMP, IDL, Matlab, OpenGL, Maya, Perl, etc.

OS experience: Unix, RedHat Linux 8.0, AIX, Win98/NT/2000/XP,

Supercomputer Experience: Beowulf cluster, IBM P5 series and SP3/SP2

Community Services

Vice President of Chinese Student and Scholar Association at Louisiana State University, 2000-2001

Citizenship

P. R. China

Research Web Page

<http://www.phys.lsu.edu/~ou/movie/>

Reference

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