MARC L. DEROSA

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Education

2001: Ph.D. in Astrophysics, University of Colorado,
dissertation entitled "Dynamics in the Upper Solar Convection Zone", directed by Prof. Juri Toomre
1997: M.S. in Astrophysics, University of Colorado
1994: B.A. (with honors) in Physics, Johns Hopkins University

Professional Interests

I am interested in using my scientific computing experience and analytical reasoning skills in the development of advanced computing solutions to leading-edge scientific problems. I expect to apply the technical programming, data analysis, and visualization expertise acquired during my Ph.D. research to challenging projects within a stimulating working environment.

Employment History

1994–present: University of Colorado, Laboratory for Computational Dynamics, Research Assistant

To study the intricate dynamics of turbulent convection present in the upper layers of the solar convection zone, I have coordinated two complementary research paths involving both detailed numerical simulations of rotating turbulent fluids as well as surface flow measurements of the supergranulation pattern visible at the solar surface.

Numerical Modeling Project:

- Designed and maintained 3-D numerical simulations of a convectively unstable fluid within a spherical shell domain, studying how realistic stellar stratification and differential rotation profiles affect the resulting turbulent convection.
- Used massively parallel machine architectures such as the Cray T3E, SGI Origin 2000, and the IBM Blue Horizon for such 3-D simulations.
- I have substantial experience managing and visualizing the massive datasets (several TB) produced by these simulations.

Observational Data Analysis Project:

- Used long time series of images (approx. 10,000 images per dataset) observed by the MDI instrument on the SOHO spacecraft to measure the near-surface velocity field associated with solar supergranulation.
- Determined the distribution of supergranular cell sizes and lifetimes by individually locating all supergranules present in each dataset.

1994–1997: University of Colorado, Teaching Assistant

Taught several sections of undergraduate astronomy labs which accompany both the introductory and accelerated astronomy courses.

1991–1994: Johns Hopkins University, Work-Study Assistant

Assisted with programming for image data analysis software used to analyze incoming data from the UVISI instruments on board the MSX satellite.

Computing Skills

Languages: FORTRAN 90, HTML, C, C++
Applications: IDL, LaTeX, Viz, Word, Excel, PowerPoint
Platforms: UNIX, Windows

References

- Prof. Juri Toomre
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  University of Colorado, Boulder, CO 80309-0440
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- Prof. Ellen Zweibel
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  Contact info: 303-492-8754, zweibel@solarz.colorado.edu

- Dr. Peter Gilman
  High Altitude Observatory, National Center for Atmospheric Research
  P.O. Box 3000, Boulder, CO 80307-3000
  Contact info: 303-497-1546, gilman@hao.ucar.edu

Bibliography

Papers in Refereed Journals:

1. "New Approach to Study Extended Evolution of Supergranular Flows and their Advection of Magnetic Elements", Lisle, J., DeRosa, M. & Toomre, J. 2000, *Solar Physics*, 197, 21.

2. "Near-Surface Flow Fields Deduced Using Correlation Tracking and Time-Distance Analyses", DeRosa, M., Duvall, Jr., T.L. & Toomre, J. 2000, *Solar Physics*, 192, 351.

Papers in Preparation:

1. "A New Study of Supergranular Flows Deduced from Correlation Tracking Analyses", DeRosa, M. & Toomre, J. 2001, *ApJ*, in preparation.

2. "Three-Dimensional Numerical Models of Supergranular Scales of Convection in Shallow Rotating Spherical Shells", DeRosa, M. Gilman, P.A. & Toomre, J. 2001, *ApJ*, in preparation.

Conference Publications and Presentations:

1. "Numerical Simulations of Supergranular Scales of Convection in Shallow Spherical Shells", DeRosa, M.L. & Toomre, J. 2001, in A. Wilson (ed.), *Proceedings of the SOHO 10/GONG 2000 Workshop, 'Helio- and Astero-seismology at the Dawn of the Millennium'*, ESA SP–464, vol. 2, p. 595.

2. "Turbulent Convection and Subtleties of Differential Rotation Within the Sun", Toomre, J., Brun, A.S., DeRosa, M., Elliott, J.R. & Miesch, M.S. 2001, in P. Brekke, B. Fleck & J.B. Gurman (eds.), *Recent Insights into the Physics of the Sun and Heliosphere*, ASP Conference Series, vol. 200, in press.

3. "Evolving Dynamics of the Supergranular Flow Field", DeRosa, M., Lisle, J. & Toomre, J. 2000, in 31st Meeting of the AAS/SPD, Lake Tahoe, NV (poster).

4. "Comparison Between Near-Surface Flow Fields Deduced from Correlation Tracking and Time-Distance Helioseismology Methods", DeRosa, M., Duvall, Jr., T.L. & Toomre, J. 1999, in 30th Meeting of the AAS/SPD and 194th Meeting of the AAS, Chicago, IL (poster).

5. "Correlation Tracking of Mesogranules from SOI-MDI Doppler Images to Reveal Supergranular Flow Fields", DeRosa, M.L. & Toomre, J. 1998, in S. Korzennik & A. Wilson (eds.), *Proceedings of the SOHO 6/GONG 98 Workshop, 'Structure and Dynamics of the Interior of the Sun and Sun-like Stars'*, ESA SP–418, vol. 2, p. 753.

6. "Supergranular Flow Fields Revealed by Tracking Mesogranules in Doppler Images From SOI-MDI", DeRosa, M.L. & Toomre, J. 1998, in 29th Meeting of the AAS/SPD and AGU 1998 Spring Meeting, Boston, MA (poster).

7. "The Nature of Supergranulation from SOI-MDI Dopplergrams", DeRosa, M.L. & Toomre, J. 1997, in 28th Meeting of the AAS/SPD, Bozeman, MT (poster).