Justin Michael Brown

Personal Data

Phone:	1 (831) 252-0921	Address:	Naval Postgraduate School
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			Department of Oceanography
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Education

June 2016 — PhD in Astrophysics, **University of California, Santa Cruz**
Advisers: Pascale Garaud & Stan Woosley

May 2011 — BA in Astrophysics and Music, **Franklin and Marshall College**
Major GPA: 4.0, *summa cum laude* Minor: Applied Mathematics
Adviser: Fronefield Crawford III

Research

Present – June 2020 — Research Assistant Professor at **Naval Postgraduate School**
Used private and public supercomputing facilities to forward fluid dynamics research in for military and climate applications. Advised 10 master's students and 2 PhD students on computational fluid dynamics subjects, including body-forcing, wake dynamics, and topography.

May 2020 – June 2016 — NRC Postdoctoral Fellow at **Naval Postgraduate School**
Simulated 2D and 3D fluid models from micro-scale to meso-scale on topics ranging from double-diffusive convection to baroclinic instability.

Mentored 11 master's students and 1 PhD student on computational fluid dynamics topics and scientific paper writing, including thermal wakes and double-diffusive convection.

June 2016 – Sept. 2011 — PhD Candidate at **University of California, Santa Cruz**
Simulated 3D hydrodynamical models of double-diffusive convection to develop flux models. Implemented such models into the 1D stellar evolution code KEPLER.

Developed and optimized a 2D spectral element code to incorporate more advanced physics into simulations of semi-convection.

Grants, Awards, and Honors

2028 – 2024 — Grant OCE-2342301, **National Science Foundation**
Awarded $72,685 to study the dynamics and transport of thermohaline intrusions.

2023 – 2022 — Seedling Project, **NPS Foundation**
Awarded $100,000 to study the thermal signatures of submerged wakes.

2022 – 2018 — Renewal OCE110011, **XSEDE**
Co-wrote yearly proposal for high-performance computer time on Stampede-2 and Bridges-2, awarded over 38 million computer hours across five years.

May 2020 – June 2016 — NRC Postdoctoral Fellowship, **National Academy of Sciences**
Four-year fellowship at a sponsored federal laboratory or institution.

2014 — Grant AST-1412951, **National Science Foundation**
Co-wrote a proposal to the NSF to study "Fingering convection: enhanced mixing and the emergence of large-scale structures", which was successfully funded.

Aug. 2015	Office of Science Graduate Fellowship, **DOE**
Sept. 2012	Three-year fellowship designed to fund proposed research by a graduate student within the Office of Science areas of research.

Computational Experience

Languages:	C/C++,Fortran,OpenMPI,Python,LaTeX
Applications:	Mathematica,Matlab,Paraview

Selected Publications

Davis, T. J., Radko, T., **Brown, J. M.**, Dewar, W. K., "Rough topography and fast baroclinic Rossby waves", 2025, *Geophysical Research Letters*, 52: e2024GL112589.

Brown, J. M., and T. Radko, "Patterns, Transport, and Anisotropy of Salt Fingers in Shear", 2024, *J. Phys. Oceanogr.*, 54: 877–893

Brown, J. M., Radko, T., "Disruption of Arctic staircases by shear", 2022, *Geophysical Research Letters*, 49: e2022GL100605.

Nadaf, E., **Brown, J. M.**, Radko, T.; "Turbulent wakes in a non-uniformly stratified environment", 2022, *Physics of Fluids*, 34: 10, 105123.

Brown, J. M., Zimny, J., Radko, T., "Identifying the Origin of Turbulence Using Convolutional Neural Networks", 2022, *Fluids*, 7: 7, 239

Brown, J. M., Radko, T., "ROME: A Pseudo-Spectral Algorithm for Time-Dependent Shear Flows in Stratified Environments", 2021, *JAMES*, 13: 11

Brown, J. M., Radko, T., "Diffusive Staircases in Shear: Dynamics and Heat Transport", 2021, *JPO*, 51: 6, 1915–1928

Brown, J. M., Gulliver, L. T., Radko, T., "Effects of Topography and Orientation on the Nonlinear Equilibration of Baroclinic Instability", 2019, *JGR Oceans*, 124, 6720–6734

Brown, J. M., Radko, T., "Initiation of Diffusive Layering by Time-Dependent Shear", 2019, *JFM*, 858, 588–608 [**article featured in Advances in Engineering**]

Danielletto, M., **Brown, J., M.,**, Radko, T., "The Immortal Science of Dead Water: Effects of Internal Wave Drag on Propagating Submerged Bodies", 2019, *Journal of Oceanography and Marine Research*, 7, 191

Brown, J. M., "The Effects of Small-Scale Mixing Processes on Supernova Progenitors", 2016, PhD Thesis, Univerisy of California, Santa Cruz

Sukhbold, T., Ertl, T., Woosley, S. E., **Brown, J. M.**, Janka, H. T., "Core-Collapse Supernovae from 9 to 120 Solar Masses Based on Neutrino-powered Explosions", 2016, *ApJ*, 821, 1

Garaud, P., Medrano, M., Mankovich, C., **Brown, J. M.**, Moore, K., 2015, "Excitation of gravity waves by fingering convection, and the formation of compositional staircases in stellar interiors", *ApJ*, 808, 89

Brown, J. M., Woosley, S. E., "Nucleosynthetic Constraints on the Mass of the Heaviest Supernovae", 2013, *ApJ*, 769, 99

Brown, J. M., Garaud, P., Stellmach, S., "Chemical Transport and Spontaneous Layer Formation in Fingering Convection in Astrophysics", 2013, *ApJ* 768, 34

Brown, J. M., Kilic, M., Brown, W. R., Kenyon, S. J., "The Binary Fraction of Low-Mass White Dwarfs", 2011, *ApJ* 730, 67

Selected Talks and Posters

Brown, J. M., Radko, T., "Can Propagating Shear Create Arctic Staircases?", Geophysical and Astrophysical Fluid Dynamics Seminar, 2018, Univerisy of California, Santa Cruz Applied Math Department, Invited Talk

Brown, J. M., Radko, T., "Internal Gravity Wave Interactions with Double-Diffusive Instabilities", EGU General Assembly Conference Abstracts, 2017, #5667, Poster

Brown, J. M., Garaud, P., "Studying Semi-Convection by Pseudo-Incompressible Spectral Element with Variable Diffusivity", AAS Meeting Abstracts, 2015, 225, #342.14, Poster

Brown, J. M., Garaud, P., Woosley, S. E., "Implementing New Semi-Convection & Overshooting Prescriptions in KEPLER", AAS Meeting Abstracts, 2014, 223, #415.05, Talk

Brown, J. M., Garaud, P., Moll, R., "Modeling Double-Diffusive Convection in Stars", DOE Office of Science Graduate Fellowship Annual Research Meeting, July 28–31, 2013, Poster

Invited Talks for Non-Scientists

Brown, J. M., "Bubble, Bubble, Toil, & Trouble: Mixing in Stars", Henry Cowell Redwoods State Park, 11 July 2014, Audience estimated at 40 locals

Brown, J. M., "The Lives & Deaths of Stars", Santa Cruz Museum of Natural History, 28 June 2014, Audience estimated at 30 locals

Brown, J. M., Jennings, Z., "The Lives & Deaths of Stars", IBM Silicon Valley Lab, 13 September 2013, Audience estimated at 300 IBM employees & family