

Special Issue

Analytical and Numerical Methods for Nonlinear Geofluid Dynamics and Wave Propagation

Message from the Guest Editor

This Special Issue invites papers that focus on recent and novel developments in the analytical and numerical modeling of nonlinear geofluid flows and wave phenomena. We especially welcome contributions that merge precise mathematical analysis with physical modeling—such as the application of Lie groups, symmetry transformations and exact or approximate solutions to the foundational governing equations of fluid mechanics to capture complex regular and irregular patterns in geophysical fluids.

- Analytical methods and exact solutions for nonlinear partial differential equations in fluid dynamics;
- Symmetry analysis, Lie groups and invariant transformations for hydrodynamic systems;
- Advanced numerical schemes and computational fluid dynamics (CFD) for shallow-water frameworks;
- Nonlinear wave propagation, solitary waves and Cauchy–Poisson free boundary problems;
- Stratified flows, rotating fluids, planetary waves and ocean–atmosphere dynamics;
- Hydrodynamic stability theory, Kelvin–Helmholtz instabilities and turbulence modeling;
- Real-world mathematical modeling of natural phenomena in meteorology, oceanography and geophysics.

Guest Editor

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Deadline for manuscript submissions

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About the Journal

Message from the Editor-in-Chief

The journal *Mathematics* publishes high-quality, refereed papers that treat both pure and applied mathematics. The journal highlights articles devoted to the mathematical treatment of questions arising in physics, chemistry, biology, statistics, finance, computer science, engineering and sociology, particularly those that stress analytical/algebraic aspects and novel problems and their solutions. One of the missions of the journal is to serve mathematicians and scientists through the prompt publication of significant advances in any branch of science and technology, and to provide a forum for the discussion of new scientific developments.

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