

## Topics for the scientific researcher position (post-doctoral)

- The water wave problem for stratified multi-layer domains. Variational formulations of the two-dimensional water wave problem.
- The three-dimensional water wave problem: The vorticity equation, stratification, geophysical effects, bottom topography.
- The general equations of fluid mechanics describing the atmosphere: the equation of conservation of momentum, the equation of mass conservation, the equation of state, and a first law of thermodynamics.
- Derivations of suitable approximate equations to the full nonlinear equations describing the atmosphere: derivation of exact solutions to the latter approximations, qualitative properties.
- Geophysical flows with a preferred propagation direction.
- Azimuthal flows with azimuthal variations.

## Bibliography

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G. M. Lieberman and N. S. Trudinger. Nonlinear oblique boundary value problems for nonlinear elliptic equations, Trans. Amer. Math. Soc. 295 (1986), 509-546.

A. J. Majda and A. L. Bertozzi: Vorticity and incompressible flows. Cambridge Texts in Applied Mathematics, Cambridge University Press, 2002.

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