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Global well-posedness for the 2D Boussinesq system without heat diffusion with anisotropic viscosity

In this talk I will discuss global existence and uniqueness theorems for the two-dimensional non-diffusive Boussinesq system with viscosity only in the horizontal direction. In proving the uniqueness result, we have used an alternative approach by writing the transported temperature (density) as $\theta = \Delta\xi$ and adapting the techniques of V. Yudovich for the 2D incompressible Euler equations. This new idea allows us to establish uniqueness results with fewer assumptions on the initial data for the transported quantity θ . Furthermore, this new technique allows us to establish uniqueness results without having to resort to the paraproduct calculus of J. Bony. If time permits I will also discuss the global regularity of an inviscid α -regularization for the two-dimensional inviscid, non-diffusive Boussinesq system of equations, which we call the Boussinesq-Voigt equations and a Voigt- α regularization for the inviscid 3D Boussinesq equations with diffusion.

This is joint work with Adam Larios and Edriss S. Titi