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Global regularity for the 2D Boussinesq equations with partial viscosity terms. (English)

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Summary: We prove the global in time regularity for the 2D Boussinesq system with either the zero diffusivity or the zero viscosity. We also prove that as diffusivity (viscosity) tends to zero, the solutions of the fully viscous equations converge strongly to those of zero diffusion (viscosity) equations. Our result for the zero diffusion system, in particular, solves the Problem no. 3 posed by *H. K. Moffatt* [*R. L. Ricca* (ed.), *Kluwer Academic Publishers, Dordrecht, The Netherlands, 3–10* (2001; [Zbl 1100.76001](#))].

MSC:

[35Q35](#) PDEs in connection with fluid mechanics

[76B03](#) Existence, uniqueness, and regularity theory for incompressible inviscid fluids

[76D03](#) Existence, uniqueness, and regularity theory for incompressible viscous fluids

[76D09](#) Viscous-inviscid interaction

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Keywords:

Boussinesq equations; vanishing viscosity limit; vanishing diffusivity limit; global regularity

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