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Global regularity of the regularized Boussinesq equations with zero diffusion. (English)

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Summary: In this paper, we consider the n -dimensional regularized incompressible Boussinesq equations with a Leray-regularization through a smoothing kernel of order α in the quadratic term and a β -fractional Laplacian in the velocity equation. We prove the global regularity of the solution to the n -dimensional logarithmically supercritical Boussinesq equations with zero diffusion. As a direct corollary, we obtain the global regularity result for the regularized Boussinesq equations with zero diffusion in the critical case $\alpha + \beta = \frac{1}{2} + \frac{n}{4}$. Therefore, our results settle the global regularity case previously mentioned in the literatures.

MSC:

- 35Q35 PDEs in connection with fluid mechanics
- 76D03 Existence, uniqueness, and regularity theory for incompressible viscous fluids
- 35Q86 PDEs in connection with geophysics
- 86A05 Hydrology, hydrography, oceanography
- 35B65 Smoothness and regularity of solutions to PDEs

Keywords:

Boussinesq equations; Leray- α model; global regularity

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