Hmidi, Taoufik

On a maximum principle and its application to the logarithmically critical Boussinesq system. (English) Zbl 1264.35173

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Summary: In this paper we study a transport-diffusion model with some logarithmic dissipations. We look for two kinds of estimates. The first is a maximum principle whose proof is based on Askey theorem concerning characteristic functions and some tools from the theory of C_0-semigroups. The second is a smoothing effect based on some results from harmonic analysis and submarkovian operators. As an application we prove the global well-posedness for the two-dimensional Euler-Boussinesq system where the dissipation occurs only on the temperature equation and has the form $|D|/\log^{\alpha}(e^4+D)$, with $\alpha \in [0, \frac{1}{2}]$. This result improves on an earlier critical dissipation condition ($\alpha = 0$) needed for global well-posedness.

MSC:

35Q35	PDEs in connection with fluid mechanics	Cited in **1** Review
76D03	Existence, uniqueness, and regularity theory for incompressible viscous fluids	Cited in **26** Documents
35Q31	Euler equations	

Keywords:

Boussinesq system; logarithmic dissipation; global existence

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