

Higher order corrections to the approximation of the 2d dual semi-geostrophic equation by the Euler vorticity equation

Ioannis Giannoulis

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Abstract

The dual semi-geostrophic equation is a coupled transport/Monge-Ampère system, while the 2d Euler equation in vorticity form is a coupled transport/Poisson system, which possesses smooth solutions globally in time. G. Loeper showed in 2006 that at a macroscopic time scale solutions of the former can be approximated by solutions of the latter over arbitrary large finite macroscopic times. We present recent results of ongoing work concerning the derivation and justification of equations describing the dynamics of higher-order corrections to the leading order approximation by the Euler vorticity equation, thus refining the result of Loeper. (This is joint work with V. Kalivopoulos in the framework of a project financed by HFRI.)