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Analytical results for the Lagrangian averaged Euler equations

3D Lagrangian averaged Euler equation (also known as Euler-alpha equation) has both practical and theoretical significance. On one hand, it can be applied to the study of turbulence as a closure model; on the other hand, it enjoys similar geometrical and analytical structures as that of the 3D Euler equations and thus can be studied as a regularized model of the latter. In this talk, we will discuss some analytical results for 3D Lagrangian averaged Euler equation, such as local well-posedness in Triebel-Lizorkin spaces, a Beale-Kato-Majda type necessary and sufficient condition for global existence involving the stream function, and new sufficient conditions for global existence in terms of mixed Lebesgue norms of the generalized Clebsch variables.

This is joint work with Xinwei Yu.