A nonlinear depletion mechanism of vorticity in 2D Boussinesq equation

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Abstract:

Here we present one nonlinear depletion mechanism of vorticity in the 2D Boussinesq equation by defining an elliptic region in the flow where the magnitude of vorticity ω^2 is larger than $tr(\nabla v \cdot \nabla v^t)$, and showing that as long as one particle lies in the elliptic region, and the magnitude of vorticity on the particle is monotonically increasing, then the vorticity on the particle will not blowup in finite time.