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Peer Review

Review of: "Euler-Lagrangian Approach to Fluid Dynamics and the Incompleteness of the Navier-Stokes Equations"

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This theoretical derivation is thought-provoking. However, experiments with this new term reveal several issues. When applied to a standard flow with solid boundaries, the term introduces numerically pathological and physically questionable behavior.

The core problem arises in regions of high shear, such as boundary layers, where it generates an unphysical normal force. To prevent the flow from penetrating the wall, a locally high, unphysical pressure gradient is generated in response.

In the bulk fluid, away from walls, the term is also problematic. Depending on its sign, it acts either as a source of artificial energy dissipation that damps the flow, or it triggers widespread numerical oscillations due to its highly non-linear nature.

These results suggest a challenge to the paper's premise. The standard model, where acceleration creates a velocity field from which vorticity is a diagnostic property, remains consistent with the simulation. The proposed model, where vorticity directly generates a component of acceleration, appears to be inconsistent with these physical and numerical constraints.

Declarations

Potential competing interests: No potential competing interests to declare.

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