Abstract Submitted
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Extreme Growth of Enstrophy on 2D Bounded Domains[1] BARTOSZ PROTAS, ADAM SLIWIAK, McMaster Univ — We study the vortex states responsible for the largest instantaneous growth of enstrophy possible in viscous incompressible flow on 2D bounded domain. The goal is to compare these results with estimates obtained using mathematical analysis. This problem is closely related to analogous questions recently considered in the periodic setting on 1D, 2D and 3D domains. In addition to systematically characterizing the most extreme behavior, these problems are also closely related to the open question of the finite-time singularity formation in the 3D Navier-Stokes system. We demonstrate how such extreme vortex states can be found as solutions of constrained variational optimization problems which in the limit of small enstrophy reduce to eigenvalue problems. Computational results will be presented for circular and square domains emphasizing the effect of geometric singularities (corners of the domain) on the structure of the extreme vortex states.

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