

Abstract Submitted  
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**The role of inertia in active nematic turbulence** COLIN-MARIUS KOCH, MICHAEL WILCZEK, Max Planck Institute for Dynamics and Self-Organization — Suspensions of active agents with nematic interactions can exhibit complex spatio-temporal dynamics such as mesoscale turbulence. Continuum descriptions for such systems are inspired by the hydrodynamic theory of liquid crystals and introduce additional effects of active stresses. The resulting equations feature an advective nonlinearity which represents inertial effects. The typically low Reynolds number of such active flows raises the question of the importance of the inertial effects. To address this question, we investigate mesoscale turbulence in a two-dimensional dense suspension of active nematic liquid crystals. We compare numerical simulations with and without nonlinear advection of the flow field. We find that for sufficiently high activity, the simulations including nonlinear advection exhibit large-scale motion which is not observed when excluding advection. Performing a spectral analysis of the energy budget, we identify an inverse energy transfer to the largest scales highlighting the importance of inertial effects in this model. We additionally show that surface friction, mimicked by a linear friction term, dissipates the transported energy and suppresses the large-scale motion.

Colin-Marius Koch  
Max Planck Institute for Dynamics and Self-Organization

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