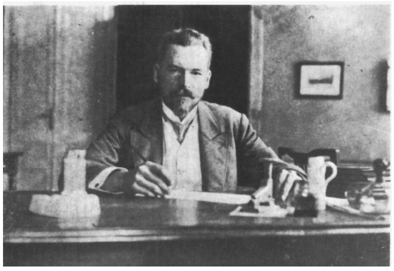

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Quantifying Active Nematic Turbulence

Tuesday, 26 September 2023 16:36 (1 minute)

Biological systems ranging from cytoskeletal networks to bacterial suspensions and epithelial monolayers exhibit complex chaotic flows known as active turbulence. Countless active molecular interactions combine to form a turbulent mix of behaviours, with fascinating non-equilibrium properties. With an eye to developing a quantitative understanding, we study turbulence and spatiotemporal chaos in 2D active nematics. Combining theory and GPU-accelerated simulations, we quantify characteristics of this activity-dependent chaos using correlations, non-Gaussianity of distributions, and finite-time Lyapunov exponents and their associated vectors. These numerical results are compared with data from microtubule-kinesin active nematics experiments. These analyses allow us to place active turbulence within the framework of dynamical systems, providing a more holistic, quantitative understanding of this phenomenon.

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