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# Quadrupolar active stress induces exotic phases of defect motion in active nematics

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A wide range of living and artificial active matter exists in close contact with substrates and under strong confinement, where in addition to dipolar active stresses, quadrupolar active stresses can become important. Here, we numerically investigate the impact of quadrupolar non-equilibrium stresses on the emergent patterns of self-organisation in non-momentum conserving active nematics. Our results reveal that beyond having stabilising effects, the quadrupolar active forces can induce various modes of topological defect motion in active nematics. In particular, we find the emergence of both polar and nematic ordering of the defects, as well as new phases of self-organisation that comprise topological defect chains and topological defect asters. The results contribute to further understanding of emergent patterns of collective motion and non-equilibrium self-organisation in active matter.

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## Field of study

Biophysics

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