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Dynamics and structure of an apolar active suspension in annulus[1] SHENG CHEN, Michigan State University, PENG GAO, University of Science and Technology of China, TONG GAO, Michigan State University — We study the complex dynamics of a two-dimensional suspension comprising non-motile active particles confined in an annulus. A coarse-grained liquid crystal model is employed to describe the nematic structure evolution, and hydrodynamically couples with the Stokes equation to solve for the induced active flows in the annulus. For dilute suspensions, coherent structures are captured by varying particle activity and gap width, including unidirectional circulations, traveling waves, and chaotic flows. For concentrated suspensions, the internal collective dynamics are featured by motile disclination defects and flows. In particular, we observe an intriguing quasi-steady state at certain gap widths during which +1/2-order defects oscillate around equilibrium positions accompanying traveling-wave flows that switch circulating directions periodically. We perform linear stability analyses to reveal the underlying physical mechanisms of pattern formations during a concatenation of phase transitions.

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Tong Gao
Michigan State University

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