

Nonequilibrium behaviors of nematic liquid crystals flowing in porous media

Takeaki Araki¹

¹Department of Physics, Kyoto University, Japan

We report numerical studies on nematic liquid crystals flowing in porous media. With strong anchoring, the director field cannot align uniformly and topological defects are stably formed. Depending on the geometry, some of the defects are topologically locked inside the channels and the others are free from the topological locking. In a weak flow, both the locked and free defects are sustained, only showing small displacements of the positions. In an intermediate flow, the free defects move with the background flow. When the defects reach a critical displacement, they are annihilated and new ones are generated near the original positions repeatedly. In a strong flow, even the locked defects show similar repeated motions with a longer period. We also show flow can switch the orientation of the nematic phase. Owing to the topological locking, the orientation is memorized even after the flow is stopped.

1. T. Araki, *Phys. Rev. Lett.*, **109**, 257801 (2012).
2. T. Araki, F. Serra and H. Tanaka, *Soft Matter* (in press).