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Angular momentum transport in soft anisotropic matter[1] MARK WARNER, Cavendish Laboratory, University of Cambridge, PETER PALFFY-MUHORAY, Liquid Crystal Institute, KSU, MICHAEL SHELLEY, Courant Institute of Mathematical Sciences, NYU, XIAOYU ZHENG, Dept. of Mathematical Sciences, KSU, CAVENDISH LABORATORY TEAM, LIQUID CRYSTAL INSTITUTE TEAM, COURANT INSTITUTE OF MATHEMATICAL SCIENCES TEAM, DEPT. OF MATHEMATICAL SCIENCES TEAM — If an anisotropic crystal is placed in a magnetic field, it will tend to rotate into alignment as a rigid body. An anisotropic sample of soft matter, such as a liquid crystal or a liquid crystal elastomer, will behave differently; initially, only the anisotropic constituents rotate about their centers of mass, then interactions between them give rise to material currents and eventually to rigid body rotation. Since the external field exerts only a body torque – but no force - on the sample, it is interesting to ask how the forces which drive translational motion arise. To gain insight into this problem, we consider the response of a cylindrical liquid crystal sample in a magnetic field in a geometry where both the director and the applied field are perpendicular to the cylinder axis. We solve the equations of motion for low molecular weight liquid crystals and for liquid crystal elastomers and trace the flow of angular momentum in order to understand the details of the dynamics.

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