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Active suspensions in shear flow[1] A. AHMADI, M.C. MARCHETTI, Physics Department, Syracuse University, Syracuse NY 13244, T.B. LIVERPOOL, Department of Mathematics, University of Bristol, Bristol BS8 1TW, UK — We report on the structure and rheology of an active suspension of cytoskeletal filaments and motor proteins in shear flow. Hydrodynamics equations for an active suspension were derived earlier by us [arXiv:q-bio.CB/0703029v1] by coarse-graining the Smoluchowski equation for a model of filaments and motors. The model incorporates the coupling of orientational order to flow and accounts for the exchange of momentum between filaments and solvent. In the present study we investigate the role of active crosslinkers on the formation and stability of ordered states (polar and nematic) under external shear flow. We also study the effect of motor activity on the rheological behavior of the ordered states away from boundaries. This work may also be relevant for the understanding of the flow-driven reorientation of endothelial cells under the shear stress imposed by blood flow.

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