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Rheological behaviour of a suspension of microswimmers varying in motor characteristics[1] MAHESH TIRUMKUDULU, RICHA KARMAKAR, RANJIT GULVADY[2], K.V. VENKATESH, Indian Institute of Technology Bombay
— A suspension of motile cells exhibits complex rheological properties due to their collective motion. We measure the shear viscosity of suspensions of Escherichia coli strains varying in motor characteristics such as duration of run and tumble. At low cell densities, all strains irrespective of their motor characteristics exhibiting a linear increase in viscosity with cell density suggesting that the cells behave as a suspension of rods with an effective aspect ratio set by the motor characteristics of the bacteria. As the cell density is increased beyond a critical value, the viscosity drops sharply signaling the presence of strongly coordinated motion among bacteria. The critical density depends not only on the magnitude of shear but also the motor characteristics of individual cells. High shear rate disrupts the coordinated motion reducing its behavior, once again, to a suspension of inactive particles.

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