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Modelization and numerical simulations of a microswimmer suspension. The impact on rheology.[1] PHILIPPE PEYLA, LEVAN JIBUTI, Grenoble University France, SALIMA RAFAI, CNRS Grenoble, France, DYFCOM TEAM — Measuring quantitative and macroscopic parameters to estimate the global motility of a large population of swimming cells is a challenge. The rheology of suspensions containing such cells is a good solution to achieve such measurements. As a matter of fact, recent rheological measurements on suspensions of bacteria [1] or algae [2] have been performed very recently. These experiments showed the strong impact of microscopic swimming on macroscopic effective viscosity. Because their flagellae are located at the rear and push the bacteria forward, the chosen bacteria (Bacillus subtilis) are called pushers . The algae (Chlamydomonas Reinhardtii), though, are pullers as they use two front flagellae to pull on the fluid in a breast stroke motion. We discuss the models that have already predicted the rheology of such suspensions. We also show numerical simulations for alga suspensions. We use these simulations in order to discriminate the relevant ingredients of the modelization of the alga puller-like suspensions.

[1] Andrey Sokolov and Igor S. Aranson, Phys. Rev. Lett. 103, 148101 (2009)
[2] Salima Rafai, Levan Jibuti and Philippe Peyla, Phys. Rev. Lett. 104, 098102 (2010)

[1]Region Rhones Alpes and CIBLE Programme

Philippe Peyla
Grenoble University France

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