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Collective Swimming in a Suspension of Ellipsoidal Squirmers KOHEI KYOYA, DAIKI MATSUNAGA, YOHSUKE IMAI, TAKAMI YAMAGUCHI, TAKUJI ISHIKAWA, Tohoku University — Some recent research efforts have demonstrated the importance of biomechanics in understanding certain aspects of microorganism behaviors such as locomotion and collective motions of cells. However, former studies had problems in accurately computing many-body interaction of model microorganisms. In this study, we propose a boundary element method, based on the double-layer representation, for calculating interactions of many-body swimmers in Stokes flow regime. The proposed method allows us to analyze a large system size that could not be handled before. The model microorganism is assumed to be ellipsoid and propels itself by generating tangential velocities on its surface. Two types of microorganisms were modeled by varying the surface velocity; one is a "puller" which has the thrust-generating apparatus in front of the body such as *Chlamydomonas*, and the other is a "pusher" which has the thrust behind the body such as bacteria or spermatozoa. We then analyze interactions of 100 pullers or pushers. In both cases, some sorts of collective swimming were observed. In particular, pullers and neutral swimmers created large clusters and generated coherent structures.

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