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Feeding of swimming *Paramecium* with fore-aft asymmetry in viscous fluid PENG ZHANG, SAIKAT JANA, Department of Engineering Science and Mechanics, Virginia Tech, MATTHEW GIARRA, PAVLOS VLACHOS, Department of Mechanical Engineering, Virginia Tech, SUNGHWAN JUNG, Department of Engineering Science and Mechanics, Virginia Tech — Swimming behaviours and feeding efficiencies of *Paramecium Multimicronucleatum* with fore-aft asymmetric body shapes are studied experimentally and numerically. Among various possible swimming ways, ciliates typically exhibit only one preferred swimming directions in favorable conditions. Ciliates, like *Paramecia*, with fore-aft asymmetric shapes preferably swim towards the slender anterior while feeding fluid to the oral groove located at the center of the body. Since both feeding and swimming efficiencies are influenced by fluid motions around the body, it is important to reveal the fluid mechanics around a moving object. Experimentally, μ-PIV methods are employed to characterize the source-dipole streamline patterns and fluid motions around *Paramecium*. Numerical simulations by boundary element methods are also used to evaluate surface stresses and velocities, which give insights into the efficiencies of swimming and feeding depending on body asymmetry. It is concluded that a slender anterior and fat posterior increases the combined efficiency of swimming and feeding, which matches well with actual shapes of *Paramecium*. Discrepancies between experiments and simulations are also discussed.

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