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Flow visualization study on the near-surface motility of a flagellar propeller[1] DONGWOOK YIM, Seoul National University, JAEHYEONG CHO, SONGWAN JIN, Korea Polytechnic University, JUNG YUL YOO, Seoul National University — Understanding of the near-surface motility of microorganisms is important in many bioengineering applications including the initial formation of biofilms and energy-efficient propulsion system which is the most important part of microrobots. In particular, a new type of propeller that is optimized for low Reynolds numbers is required to propel a small object in a medium where the flow is dominated by viscous force rather than inertial force. A propeller in the shape of a bacterial flagellum seems an appropriate choice for this purpose. Thus, in this study, we carried out a flow visualization study on the velocity field near the solid surface, induced by a spring-like propeller inspired by the *E. coli* flagellum, by using a macroscopic model and applying stereoscopic particle image velocimetry. Silicone oil, which has a kinematic viscosity 100,000 times that of water, was used as the working fluid to generate the low Reynolds number condition for the macroscopic model. Thrust, torque, and velocity were measured as functions of pitch and rotational speed, and the efficiency of the propeller was calculated from the measured results.

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