Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

Hydrodynamics of bacterial spinning top[1] KENTA ISHIMOTO, Kyoto University — We have theoretically and numerically investigated monoflagellated bacterial swimming dynamics near a wall boundary with considering elastic hook flexibility to understand hydrodynamic interactions underlying the bacterial upright spinning motion, which has referred as low-Reynolds-number spinning top in a recent experimental study. We establish an elastohydrodynamic stability theory and found that the vertical spinning motion is enabled by the mechanical competition between the destabilization by the flagellar propulsion and rotational stabilization by the elastic coupling of the hook. These results demonstrate the mechanical nature of the behaviours in rich diversity and could contribute to our deeper understandings of the bacterial surface motility and biofilm formation.

[1]This work is supported in part by MEXT Leading Initiative for Excellent Young Researchers (LEADER), JSPS Grant-in-Aid for Young Scientists (18K13456), and JSPS Overseas Research Fellowship (29-0146).

Kenta Ishimoto
Kyoto University

Date submitted: 26 Jul 2019 Electronic form version 1.4