Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

Numerical Investigation of Droplet Wetting Behavior on Groove-decorated Surface.[1] ZHICHENG YUAN, MITSUHIRO MATSUMOTO, RYOICHI KUROSE, Department of Mechanical Engineering and Science, Kyoto University, KUROSE LAB TEAM — Super-hydrophobic surfaces are reported as promising candidates for self-cleaning, anti-icing, and dropwise condensation. Therefore, there are some experimental studies and numerical simulations of droplets on hydrophobic walls. However, regarding the durability issues, an alternative technology, improving the surface wettability by grooves, has drawn much attention, whereas the wetting behavior of droplet on groove-decorated substrate has not been fully studied. In this study, a 3-D numerical simulation employing the Coupled Level-Set and Volume of Fluid (CLSVOF) scheme, and the Continuum Surface Force (CSF) method are applied to a liquid drop on rigid substrate, and the validity is investigated by comparing with the experiment. The numerical models are extended to predict the dynamics of a droplet on groove-decorated substrate. The results show that our numerical methods perform well on tracking the move of a droplet on micro-grooved surfaces. In addition, decoration by micro-grooves could be a useful fabrication technology to improve the surface wettability and develop robustness and durability of super-hydrophobic surfaces.

[1]This research was partially supported by MEXT (Ministry of Education, Culture, Sports, Science, and Technology) as Priority issue on Post-K computer.

Zhicheng Yuan
Department of Mechanical Engineering and Science, Kyoto University

Date submitted: 24 Jul 2019 Electronic form version 1.4