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Geometrical effect of lubricant-containing cavity on lubricant depletion under external flow[1] HAENYEOK KIM, WOORAK CHOI, SANGJOON LEE, Department of Mechanical Engineering, Pohang University of Science and Technology — Lubricant-infused surface (LIS) has been widely investigated owing to its extensive potential to be applied to various industrial fields. However, the outermost lubricant layer of LIS can be easily depleted by external shear force, which induces a significant loss of its promising properties. In this work, the shear-induced depletion of impregnated lubricant from a single cavity was investigated with varying the geometry of lubricant-containing cavity. The effect of cavity geometry on depletion dynamics of impregnated lubricant was experimentally investigated by directly visualizing the temporal variation of lubricant menisci. The internal circulating vortex flow during lubricant depletion was measured using a particle image velocimetry (PIV). Temporal evolution of internal vortex flow in response to the liquid menisci variation was also analyzed simultaneously. As a result, a correlation between cavity geometry, internal flow structure and lubricant depletion was newly established. The present results would provide valuable insight for designing a robust LIS system for effective and sustainable applications.

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Haenyeok Kim
Department of Mechanical Engineering, Pohang University of Science and Technology

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