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Drag reduction and stability of superhydrophobic surface with flexible re-entrant structure[1] WOORAK CHOI, SANG JOON LEE, Pohang Univ of Sci Tech — Air plastron in microstructures of a superhydrophobic (SHPo) surface induces a liquid to flow with slip over the surface and it increase drag reduction efficiency. However, unstability of the air inhibit utilization of the SHPo surface. Here, a pressurization and a pressure gradient are considered as physical conditions of the application including ships. SHPo surfaces with differently sized ridges with partition structures and re-entrant structures are fabricated. Partition structures are introduced in the ridges to control length of the ridges Air depletion in transparent ridge structures is visualized in various pressure condition. Increased pressure and pressure gradient condition deform air-water meniscus and disrupt the air in the ridge. Critical conditions for air depletion and drag reduction efficiency are compared between different sizes and flexibility of the micro-structures. Ridges with smaller width, length and high flexibility could sustain the air plastron in higher pressure and pressure gradient condition. Theoretical models are derived to anticipate the stability condition.

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