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Drag reduction of sustainable slippery surface of marine algae Miyeok (Undaria pinnatifida)[1] SEONGKWANG HEO, Pohang University of Science and Technology, GUN YOUNG YOON, Korea Workers' Compensation and Welfare Service, EUNSEOK SEO, WOORAK CHOI, SANG JOON LEE, Pohang University of Science and Technology — The development of a sustainable drag reduction surface is important in various engineering applications. Miyeok has mucilage gland cells to secrete mucus which works as a lubricant. In this work, the effects of surface structure of Miyeok on drag reduction and sustainability were experimentally investigated. A negative mold of Miyeok replica was fabricated to mimic the morphological structures and the replica surface was dipped into silicone oil solution. The structural similarity between the replica and Miyeok was confirmed by their scanning electron microscopy images. Pressure drop and slip length were measured to estimate their drag reduction effects. The slip lengths were estimated by using both particle image velocimetry and particle tracking velocimetry velocity field measurement techniques. The structural effects of the fabricated replica on sustainability under external flow in a circulating water channel were examined by measuring contact angle hysteresis. The replica exhibits higher drag reduction effect and better sustainability, compared to an oil-infused flat PDMS. The present results would be utilized for better understanding on the drag reduction mechanism of natural seaweeds and developing a biomimetic sustainable drag reduction surface.

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