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Hydrodynamic role of longitudinal ridges in a leatherback turtle swimming[1] KYEONGTAE BANG, JOOHA KIM, SANG-IM LEE, HAECHEON CHOI, Seoul National University — The leatherback sea turtle (*Dermochelys coriacea*), the fastest swimmer and the deepest diver among marine turtles, has five longitudinal ridges on its carapace. These ridges are the most remarkable morphological features distinguished from other marine turtles. To investigate the hydrodynamic role of these ridges in the leatherback turtle swimming, we model a carapace with and without ridges by using three dimensional surface data of a stuffed leatherback turtle in the National Science Museum, Korea. The experiment is conducted in a wind tunnel in the ranges of the real leatherback turtles Reynolds number (Re) and angle of attack (α). The longitudinal ridges function differently according to the flow condition (i.e. Re and α). At low Re and negative α that represent the swimming condition of hatchlings and juveniles, the ridges significantly decrease the drag by generating streamwise vortices and delaying the main separation. On the other hand, at high Re and positive α that represent the swimming condition of adults, the ridges suppress the laminar separation bubble near the front part by generating streamwise vortices and enhance the lift and lift-to-drag ratio.

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