Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

Effect of longitudinal ridges on the hydrodynamic performance of a leatherback turtle model[1] KYEONGTAE BANG, JOOHA KIM, SANG-IM LEE, HAECHEON CHOI, Seoul Natl Univ — Leatherback sea turtles (*Dermochelys coriacea*) known as the fastest swimmer and the deepest diver among marine turtles have five longitudinal ridges on their carapace, and these ridges are the most remarkable morphological features distinguished from other marine turtles. To investigate the effect of these ridges on the hydrodynamic performance of the leatherback turtle, we model a carapace with and without ridges using a stuffed leatherback turtle in the National Science Museum, Korea. We measure the drag and lift forces on the ridged model in the ranges of real leatherback turtles' Reynolds number (Re) and angle of attack (α), and compare them with those of non-ridged model. At $\alpha < 6^\circ$, longitudinal ridges decrease drag on the ridged model by up to 32% compared to non-ridged model. On the other hand, at $\alpha > 6^\circ$, the drag and lift coefficients of the ridged model are higher than those of the non-ridged model, and the lift-to-drag ratio of the ridged model is higher by about 7% than that of the non-ridged model. We also measure the velocity field around both models using a particle image velocimetry and explain the hydrodynamic role of ridges in relation to diving behaviors of leatherback sea turtles.

[1]Supported by the NRF program (2011-0028032).

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Date submitted: 29 Jul 2014 Electronic form version 1.4