Abstract Submitted
for the DFD06 Meeting of
The American Physical Society

Flow over a Biomimetic Surface Roughness Microgeometry AMY WARNCKE LANG, PABLO HIDALGO, MATTHEW WESTCOTT, University of Alabama — Certain species of sharks (e.g. shortfin mako and common hammerhead) have a skin structure that could result in a bristling of their denticles (scales) during increased swimming speeds (Bechert, D. W., Bruse, M., Hage, W. and Meyer, R. 2000, Fluid mechanics of biological surfaces and their technological application. Naturwissenschaften 80:157-171). This unique surface geometry results in a three-dimensional array of cavities* (d-type roughness geometry) forming within the surface and has been given the acronym MAKO (Micro-roughness Array for Kinematic Optimization). Possible mechanisms leading to drag reduction over the shark's body by this unique roughness geometry include separation control thereby reducing pressure drag, skin friction reduction (via the 'micro-air bearing' effect first proposed by Bushnell (AIAA 83-0227)), as well as possible transition delay in the boundary layer. Initial work is confined to scaling up the geometry from 0.2 mm on the shark skin to 2 cm, with a scaling down in characteristic velocity from 10 - 20 m/s to 10 - 20 cm/s for laminar flow boundary layer water tunnel studies. Support for this research by NSF SGER grant CTS-0630489 and a University of Alabama RAC grant is gratefully acknowledged. * Patent pending.

Amy Warncke Lang
University of Alabama

Date submitted: 02 Aug 2006 Electronic form version 1.4