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Flow Measurements over a Biomimetic Surface Roughness Microgeometry AMY LANG, PABLO HIDALGO, MATTHEW WESTCOTT, University of Alabama — Certain species of sharks (e.g. shortfin mako) have a skin structure that results in a bristling of their denticles (scales) during increased swimming speeds. This unique surface geometry results in the formation of a 3D array of cavities* (d-type roughness geometry) within the shark skin, thus causing it to potentially act as a means of boundary layer control. 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 over a shark skin model. The hypothesized formation of cavity vortices within the shark skin replica has been measured using DPIV. We have also shown that with the sufficient growth of a boundary layer upstream of the model (local Re = 200,000), transition is not tripped by the surface and the flow skips over the cavities. Support for this research by a NSF SGER grant (CTS-0630489), Lindbergh Foundation Grant and a University of Alabama RAC grant is gratefully acknowledged. * Patent pending.

Amy Lang
University of Alabama

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