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Experimental Study of the Boundary Layer Formation over Three Dimensional Arrays of Embedded Hexagonal Cavities[1] BLAKE MELNICK, AMY LANG, University of Alabama — With increasing fuel costs, research into reducing drag over solid surfaces in high Reynolds number flows is still an area of interest. There have been many studies examining the boundary layer flow over two-dimensional microgeometries (e.g. riblets), but very few studies involving three dimensional microgeometries. The main objective of this study was to examine how embedded vortices, forming in hexagonal cavities, affect the boundary layer flow over a solid surface. It is believed that stable embedded vortices produce a partial slip condition, which could result in decreasing the skin friction and delaying the transition to turbulence while also acting as a means of separation control. To study the boundary layer flow, a model was constructed using a hexagonal array of cavities embedded into a flat plate. Using a water tunnel, dye visualization and DPIV measurements, the boundary layer flow forming above the cavities was examined. Measurements were also compared when changing the orientation of the hexagonal cavities.

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