Development and Interaction of Artificially Generated Hairpin Vortices[1] DANIEL SABATINO, CHRISTOPHER MCKENNA[2], Lafayette College — The development and interaction of hairpin vortices are examined and categorized to better understand their role in fully turbulent boundary layers. Hairpin vortices are generated within an otherwise laminar boundary layer using a free surface water channel. Direct injection is the primary generation method and the behavior of the vortices is first examined using flow visualization. Hydrogen bubble wire is combined with dye injection to help clarify the role of the vorticity in the fluid immediately surrounding the hairpin vortex. PIV data is also used to classify the development and maturity of the vortices for a range of free stream and injection conditions. The interactions of two hairpin vortices of varying maturity are characterized to investigate the potential mechanisms for the formation of hairpin packets beyond autogeneration. Finally, the behavior of hairpin vortices generated with a new technique that uses a transient hemispherical protrusion is also examined.

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