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Dynamical Properties of Vortex Furrows in Transitioning Boundary Layers PETER BERNARD, University of Maryland — A vortex filament simulation of the spatially growing transitional boundary layer reveals the presence of low speed streaks underlying furrow-like streamwise oriented folds in the surface vorticity layer (AIAA J. Vol. 48, 2010; Proc. ETC13, 2011). The putative hairpin vortices and packets widely observed in boundary layers are found to be an illusion created by assigning the status of structure to the visualized form of regions of rotational motion created by the vortex furrows. Thus, at best, hairpins roughly describe the shape taken by that part of the vorticity within the furrows that directly causes rotation while ignoring the "invisible" and considerable non-rotational part. The life history of the furrows is discussed here including a description of how they grow and the dynamics of the vorticity field within them. Long lived furrows represent "factories" within which initially spanwise vorticity progresses from arch to either one or two-lobed mushroom-like structures in a continuous stream. Furrows grow by this same process. At the heart of the furrow phenomenon is a self-reinforcing process by which streamwise vorticity begets more streamwise vorticity.

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