

Abstract Submitted  
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**On the generation and growth of hairpin vortex packets in wall turbulence**<sup>1</sup> BEVERLEY MCKEON, California Institute of Technology, ATI SHARMA, University of Sheffield — We demonstrate that the critical layer framework of McKeon & Sharma (JFM, 2010) which was previously shown to capture aspects of the statistics of wall turbulence, also gives insight into the appearance and organization of vortical structure. The model reconciles aspects of the statistical and structural pictures of wall turbulence. Choosing suitable scales, the superposition of left- and right-going propagating modes which are attached to the wall reproduces the development of a periodic array of pro- and retro-grade hairpin vortices. The addition of mean shear associated with the turbulent mean velocity profile suppresses the retrograde vortices and enhances the prograde vortices. Further, superposition of attached modes with differing convection velocities produces packets of hairpins that evolve in both space and time. Characteristics of these vortical structures and a comparison with the vortex signatures observed in experiments will be described.

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