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Vortex packet recovery in a turbulent boundary layer perturbed by an array of cylinders YAN MING TAN, ELLEN LONGMIRE, Univ of Minn - Minneapolis — PIV measurements were acquired in a zero pressure gradient turbulent boundary layer ($\mathrm{Re}_\tau = 2500$) perturbed by a narrowly spaced (0.2δ) array of cylinders. Two array heights were considered with one extending to the top of the log region and the other to the top of the boundary layer. Wall-parallel measurements were obtained at three locations in the log region by fixed and flying PIV. The measurement system for flying PIV moves with the flow to track the evolution of structures upstream and downstream of the array. Initially, both arrays disrupt the packets such that none are apparent. Then, packets appear either to recover or re-initiate at some distance downstream. A packet signature was denoted by a low momentum region bounded by counter rotating swirling structures. A low momentum region identification algorithm was applied to both fixed and flying PIV data to quantify packet recovery downstream of the array. The results indicate that packets reappear sooner further from the wall and later closer to the wall for the shorter array supporting the top down notion of packet reorganization proposed by Zheng & Longmire (JFM, 2014). The opposite trend was observed for the taller array whereby packets recovered earlier closer to the wall and later further from the wall.

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