

Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

Time-varying secondary flows in turbulent boundary layers over surfaces with spanwise heterogeneity DEA WANGSAWIJAYA, KEVIN KEVIN, DANIEL CHUNG, IVAN MARUSIC, NICHOLAS HUTCHINS, The University of Melbourne — Secondary flows form in turbulent flow over surfaces with spanwise heterogeneity. In this study, we use surfaces comprised of spanwise alternating smooth and rough (P-36 grit sandpaper) strips to investigate the behaviour of these secondary flows for various strip widths. PIV measurements are performed on the wall-parallel plane above surfaces with various strip widths S ($0.3 \leq S/\bar{\delta} \leq 3.6$), where $\bar{\delta}$ is the spanwise-averaged boundary layer thickness. We find that, when $S/\bar{\delta} \approx 1$, these secondary flows not only strengthen but also exhibit a pronounced unsteadiness. This unsteadiness is consistent with a flapping from side-to-side of large-scale streaks with a streamwise wavelength of $3-4\bar{\delta}$.

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Date submitted: 01 Aug 2019

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