Direct Numerical Simulations of transverse acoustic forcing in fully developed channel flow turbulence ANDREA GRUBER, SINTEF, MELISSA KOZUL, JAMES R. DAWSON, NTNU — Hydrogen-firing of gas turbines is a promising direction for clean and efficient carbon-free power generation. However, premixed combustion of undiluted hydrogen in low-emission combustion systems can result in unstable operating modes for gas turbines and their development must solve issues posed by flame flashback (off-design upstream propagation), and flame combustion dynamics (coupling of longitudinal or transversal acoustic waves with fluctuating heat release). The causal relationship between longitudinal acoustically-induced bulk flow fluctuations (due to combustion dynamics) and the occurrence flashback in gas turbine burners has been established for some time (Fritz et al., J Eng Gas Turbines Power 2004) while the key role of the near-wall ‘streaks’ of the turbulent boundary layer in controlling the flashback process was only explained more recently (Gruber et al., J Fluid Mech 2012). In this context, it is important to examine the effect of transversal acoustic waves, resulting from azimuthal modes resonating in annular combustors, on the characteristic streaky structure of near-wall turbulence. We present DNS results from an idealized channel flow configuration that employs periodic boundary conditions in the streamwise and spanwise directions, where sinusoidal pseudo-acoustic waves are imposed transversally to the bulk flow, mimicking a limit cycle. We report the response of the near-wall streaks of the velocity field to the frequency and amplitude of the imposed acoustic waves.