Linear Dynamics of Turbulent Structures in the Log Layer\textsuperscript{1} OSCAR FLORES, U. Politecnica Madrid, JAVIER JIMENEZ, U. Politecnica Madrid & CTR Stanford — The long streamwise-velocity $u$—structures of the log layer are analyzed using the linearized Navier-Stokes equation for a logarithmic mean velocity profile and an appropriate eddy viscosity. A concentrated wall-normal $v$ velocity diffuses into a $v$-puff which leaves upstream a $u$ “log layer streak” with an energy maximum in the wall region. The lifetime of $v$ is short and the $u$-streak grows even after $v$ decays, eventually becoming self-similar. These results compare well with the conditionally-averaged structures obtained from turbulent channels by del Álamo et al (2005), except that here there is no wake downstream of the puff. This suggests that the puffs are created at the tails of the streaks, leading to long $u$-structures containing several puffs. This is essentially the same vortex-streak cycle known to be responsible for buffer layer streaks, but acting in the log-layer with larger self-similarly growing structures. The short life of $v$ implies that this process does not always originate at the wall. Indeed, using rough-wall profiles, the wall component weakens but the log-layer one is not affected.

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