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Identifying vertical velocity eddies from wall-pressure[1] OSCAR FLORES, CARLOS SANMIGUEL VILA, Universidad Carlos III de Madrid — During the last decades, a number of reduced order models based on coherent structures have been proposed to describe wall-bounded turbulence. Many of these models emphasize the importance of coherent vertical velocity eddies (v-eddies), which are the cause for the very long streamwise velocity structures observed in the logarithmic and outer region. In order to use these models to improve our ability to control wall-bounded turbulence in realistic applications, these v-eddies need to be identified from the wall in a non-intrusive way. In this talk, we will explore the possibility to use the pressure at the wall for this task. We will start by analyzing the correlation between the vertical velocity and the pressure at the wall, $R_{vp}(\mathbf{x}, \mathbf{t})$, where $\mathbf{x}$ is the separation between the points where wall-pressure and vertical velocity are measured, and t is the time lag. This correlation is computed from time resolved DNS of turbulent channels, at moderate Reynolds numbers ($Re_\tau \sim 10^3$). We will also present this correlation for the filtered (in time and/or in space) wall-pressure, showing how the selection of the characteristic length and time scales of the filters allows us to discriminate v-eddies centered at different distances to the wall.

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