Abstract Submitted
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Two-point correlations for zero-pressure-gradient turbulent boundary layers and channels at $Re_\tau \approx 1000 - 2000$[1] JUAN A. SILLERO, JAVIER JIMÉNEZ, U. Politécnica de Madrid, ROBERT D. MOSER, U. Texas at Austin — Two-point 5-dimensional correlations $C_{\xi\xi}(x; x'; y; y'; \Delta z)$ are investigated to educe the structure of the velocity and pressure fluctuations in zero-pressure-gradient turbulent boundary layers in the range $Re_\theta = 2780 - 6680$, and in matching channels at $Re_\tau \approx 1000 - 2000$. Eddies in channels are coherent over longer distances than in boundary layers, especially for C_{uu} in the direction of the flow. At the 5% level, the maximum streamwise length of C_{uu} is $O(6\delta)$ for boundary layers and $O(15h)$ for channels. The corresponding lengths for the transverse velocities and for the pressure are shorter, $O(\delta\text{-}2\delta)$, and of the same order for both flows. Integral correlation lengths in the streamwise and spanwise directions grow away from the wall, except for $L_{uu,x}$, which peaks at $y \approx 0.6h$ in channels and at $y \approx 0.2\delta$ in boundary layers, probably due to the outer intermittency in the latter. Above the buffer layer, C_{uu} is inclined by $\approx 10 - 12^o$ from the wall, the wall-normal velocity and the pressure are roughly vertical, and C_{ww} is inclined by $\approx 30^o$. Those features seem unaffected by the Reynolds number and by the type of flow.

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