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A formula for the von Kármán constant in terms of the flow structure of wall bounded turbulence[1] VASSILIOS DALLAS, CHRISTOS VASSILICOS, GEOFFREY HEWITT, Imperial College London — We perform Direct Numerical Simulations (DNS) of turbulent channel flows with and without several types of simulated wall activation. These DNS support our theoretical prediction that the von Kármán constant can be calculated from the formula $1/\kappa = C_s(B_2/B_1^2)\mathcal{D}$ where B_1 is the constant of proportionality between the Taylor microscale and the average distance between stagnation points (both of which depend on height from the wall without B_1 depending on it in the log-layer), C_s is a number of stagnation points of the fluctuating velocity field at the upper edge of the buffer layer, B_2 tends to 1 as $Re_\tau >> 1$ and $\mathcal{D}$ characterises the anisotropy of the fluctuating velocity field in the log-layer. This formula accounts for the possibility of non-universality of $1/\kappa$ in the sense of Reynolds number and wall-flow type dependencies.

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