Abstract Submitted
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Wall turbulence without walls[1] YOSHINORI MIZUNO, U. Politecnica Madrid, JAVIER JIMENEZ[2] — Direct numerical simulations are presented of isolated logarithmic layers without an underlying buffer zone. They are implemented by enforcing artificial boundary conditions within the logarithmic layer which are synthesized from values from the interior of the flow. As an example, simulations of a half-channel employing this technique are discussed. The results exhibit logarithmic mean velocity profiles, and velocity fluctuation intensities that are similar to those obtained by the full DNS of half or full channels. Those results strongly suggest that the formation of a logarithmic layer is not overly dependent on the presence of a near-wall region, and that such a flow can exist by itself. The technique enables us to perform conceptual experiments to clarify what is essential to the logarithmic layer. For example, preliminary results show that the logarithmic layer cannot be created only by a non-uniform shear, and requires a spatial gradient of the scales of the fluctuations. Somewhat surprisingly, some simulations result in Kármán constants fairly different from $\kappa = 0.4$, providing clues to what determines κ in real wall turbulence.

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