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Post fully rough regime in turbulent pipe flow DANIEL CRUZ, HAMIDREZA ANBARLOOEI, FABIO RAMOS, CECILIA MAGESKI, ATILA FREIRE, Federal University of Rio de Janeiro — The phenomenological model of Gioia and Chakraborty (2006) tries to relate the friction and energy spectrum in canonical flows. In this model, the momentum transfer by eddies at a specified surface above the wall balances the wall shear stress. At low Reynolds numbers, the dominant eddies are in the size of the Kolmogorov length scale (Blasius regime), while at high Reynolds numbers the dominant eddies are in the size of the roughness elements (fully rough regime). The present authors recently showed that instead of a simple transition between these two extremes, there is a third regime where the effects of the wall (through attached eddies) dominate. This results in a new power-law friction regime between the Blasius and fully rough regimes. The effects of the roughness geometry on turbulence are studied experimentally in the present work. Beside the common sand-roughed surfaces, some well geometrically defined rough walls have also been examined. As expected, by increasing the Reynolds number, the fully rough regime appears for the latter type of roughness. However, a further increase in the Reynolds reveals an unexpected behavior, where friction starts to decrease again in a power-law manner (with the same trend as observed for the third regime).

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