

Abstract Submitted
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Self-similar vortex clusters over rough walls¹ OSCAR FLORES, U. Politécnica Madrid, JAVIER JIMÉNEZ, U. Politécnica Madrid & CTR Stanford, JUAN C. DEL ÁLAMO, U. C. San Diego — The properties of vortex clusters in rough-walled turbulent channels are analysed using direct numerical simulations at $Re_\tau \approx 600$, in which roughness is simulated by distributions of velocity disturbances at the walls. The results are compared with data coming from smooth channels (del Álamo *et al* 2006 JFM 561). As in the smooth case, the present clusters separate into wall-detached objects and wall-attached ones. The detached clusters from rough and smooth walls are similar, consistent with their definition. Also expected, the attached clusters inside the roughness sublayer are quite different to those in the near-wall region over smooth walls. However, the attached clusters that reach above the buffer region are quite independent of the nature of the wall. The same result is obtained for the average velocity field conditioned to these tall attached clusters. This suggests that the dynamics of the logarithmic and outer regions depends only on the mean velocity gradient, even for vastly different velocity profiles (Flores & Jiménez, 2006, JFM in press).

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