Abstract Submitted
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Three-dimensional structure of alternative Reynolds stresses in turbulent channels[1] KOSUKE OSAWA, Tokyo Institute of Technology and UPM, JAVIER JIMENEZ, Universidad Politecnica de Madrid — As explained in another talk in this meeting, the ambiguity of the fluxes in the momentum conservation law allows alternative definitions for the Reynolds stresses. We study here the three-dimensional structures of the tangential stress that minimises the total r.m.s. flux fluctuations in turbulent channels at several $Re_\tau \geq 10^3$. As in the case of the classical shear stress, it is found that the structures can be classified into wall-detached and wall-attached families. The latter carry most of the overall stress and are geometrically self-similar, although less elongated than for the classical ones. Although they span the full range of scales from viscous to the channel height, larger structures are less common than in the classical case, apparently missing very large 'global' modes. They are also less fractal ($D_F \approx 2.5$) than the 'sponges of flakes' of the classical quadrant structures ($D_F \approx 2.1$), and more inclined with respect to the wall, 45^o versus 20^o, suggesting that they may be related to the 'hairpin legs' discussed by several authors.

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