

## ADDENDUM

A ‘win–win’ mechanism for low-drag transients in controlled two-dimensional channel flow and its implications for sustained drag reduction

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The following additional comments are provided in order to prevent misinterpretation of the third paragraph on page 194 of our paper.

Cortelezzi *et al.* (1998) treated a two-dimensional channel flow, and did not define or discuss sustained drag reduction. The drag curve that they reported started from an initial condition of laminar flow plus two-dimensional disturbances, reached a minimum of about 50% drag reduction below the laminar value, and climbed back to a value about 20% below the laminar value, and was still growing, by the end of the simulation reported. The text notes that the drag should eventually relax to the laminar value. As noted in our paper, the drag curve reported in Cortelezzi *et al.* thus appears to be consistent with it being, in our nomenclature, an ‘unsustainable’ transient excursion.

Lee *et al.* (2001) treated a three-dimensional channel flow from turbulent initial conditions and obtained 15–20% drag reduction below the turbulent value, a result that appears, from the data reported, to be sustainable. It did not address the two-dimensional problem or the applicability of the two-dimensional mechanism reported in Cortelezzi *et al.* to the three-dimensional setting; thus, the Lee *et al.* results do not supercede the Cortelezzi *et al.* result.

## REFERENCES

- CORTELEZZI, L., LEE, K. H., KIM, J. & SPEYER, J. L. 1998 Skin-friction drag reduction via robust reduced-order linear feedback control. *Intl J. Comput. Fluid Dyn.* **11**, 79.  
LEE, K. H., CORTELEZZI, L., KIM, J. & SPEYER, J. L. 2001 Application of reduced-order controller to turbulent flows for drag reduction. *Phys. Fluids* **13**, 1321.