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Pressure and kinetic energy transport across the mouth of laminar cavity flows.¹ PETER BAILEY, DIASP, Politecnico di Torino, ANTONELLA ABBA', DIMAT, Politecnico di Milano, DANIELA TORDELLA, DIASP, Politecnico di Torino — The nature of the separated recirculating cavity flow depends upon the Reynolds number (Re), the upstream flow regime, as well as the cavity aspect ratio. Here we use DNS to investigate the pressure (-pv) and kinetic energy (Kv) transport in shallow cavities in a channel, in the laminar regime varying Re (here based on the channel height). In recirculating flows the pressure-velocity correlation plays an increasingly important role in the energy balance. This is in contrast to parallel flows, such as boundary layers or channel flows, where mean shear is high, and the flow is dominated by the convective transport. This was highlighted by Yoshizawa (PoF 2002) and confirmed with the results of shearless inhomogeneous turbulent mixing Tordella et al. (PRE 2008). The cavity flow lies between these two extremes. We have shown that this trend can also be seen in laminar flows. Observing the transport properties at the cavity mouth, for Re 50-2000, Kv reaches a peak at Re=200, whereas -pv peaks at Re=700. As Re is increased from these values, and the cavity flow moves from closed to open, Kv becomes less significant, with -pv having a greater importance beyond Re=500.

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Prefer Oral Session
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