**An alternative to Reynolds stresses in turbulent channels**[1] JAVIER
JIMENEZ, Universidad Politecnica Madrid — It is remarked that fluxes in conservation laws, such as the Reynolds stresses in the momentum equation of turbulent shear flows, or the spectral energy flux in isotropic turbulence, are only defined up to an arbitrary solenoidal field. While this is not usually significant for long-time averages, it becomes important when fluxes are modelled locally in large-eddy simulations, or in the analysis of intermittency and cascades. As an example, a numerical procedure is introduced to compute fluxes in scalar conservation equations in such a way that their total integrated magnitude is minimised. The result is an irrotational vector field that derives from a potential, thus minimising sterile flux 'circuits'. The algorithm is generalised to tensor fluxes and applied to the transfer of momentum in a turbulent channel. The resulting instantaneous Reynolds stresses are compared with their traditional expressions, and found to be substantially different.

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