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Relaminarisation of fully turbulent flow in pipes JAKOB KUEHNEN, BJOERN HOF, IST Austria — Drag reduction still remains one of the most alluring applications of turbulence control. We will show that flattening the streamwise velocity profile in pipes can force turbulent flow to decay and become laminar. Two different experimental control schemes are presented: one with a local modification of the flow profile by means of a stationary obstacle and one with a moving wall, where a part of the pipe is shifted in the streamwise direction. Both control schemes act on the flow such that the streamwise velocity profile becomes more flat and turbulence gradually grows faint and disappears. Since, in a smooth straight pipe, the flow remains laminar from that position a reduction in skin friction by a factor of 5 can be accomplished. We will present measurements with high-speed particle image velocimetry, measurements of the pressure drop and videos of the development of the flow during relaminarisation. The guiding fundamental principle behind our approach to control the velocity profile will be explained and discussed.

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