

Abstract Submitted
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Controlling turbulence JAKOB KHENEN, BJRN HOF, IST Austria —

We show that a simple modification of the velocity profile in a pipe can lead to a complete collapse of turbulence and the flow fully relaminarises. The annihilation of turbulence is achieved by a steady manipulation of the streamwise velocity component alone, greatly reducing control efforts. Several different control techniques are presented: one with a local modification of the flow profile by means of a stationary obstacle, one employing a nozzle injecting fluid through a small gap at the pipe wall and one with a moving wall, where a part of the pipe is shifted in the streamwise direction. All control techniques act on the flow such that the streamwise velocity profile becomes more flat and turbulence gradually grows faint and disappears. In a smooth straight pipe the flow remains laminar downstream of the control. Hence a reduction in skin friction by a factor of 8 and more can be accomplished. Stereoscopic PIV-measurements and movies of the development of the flow during relaminarisation are presented.

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