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Wall mode instability driven transition to turbulence in a soft microchannel[1] SAGAR SRINIVAS, KUMARAN V, Indian Institute of Science — Transition to turbulence has been triggered due to structure fluid interaction at Reynolds number (Re) much lower than hard wall transition Re, in a soft walled micro channel of dimensions 40mm*1.5mm*0.16mm. Mixing index analysis indicates high degree of mixing accompanied by lower pressure drop as the channel deforms. Flow after transition velocity statistics has been extensively studied using Particle Imaging Velocimetry (PIV) along streamwise-wallnormal direction. The reduced plots of streamwise mean velocity are shown with the absence of viscous sublayer and presence of logarithmic layer with von Karman constants different from rigid wall channel. The onepoint cross correlation between velocity fluctuations is non-zero at the soft surface which is in contrast to flow in hard walled channel. This indicates that the additional fluid stress exerted on the soft surface by the fluid velocity fluctuations result in net energy transfer due to shear work done at the interface. The structure fluid interface acts as a source of energy for the mean turbulent kinetic energy which is typically zero at the interface for hard walled channel. We also detect the onset of wall-oscillations primarily tangential to the surface at the transition Re.

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