

Abstract Submitted
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Impact of drag reducing polymers on the onset of instability in a pipe with reverse flow H.J. SHASHANK, K.R. SREENIVAS, Jawaharlal Nehru Centre for Advanced Scientific Research — The objective of this study is to understand the mechanism by which drag reducing polymer (DRP) additives modify turbulent flow, so as to reduce turbulent drag. Reverse flow in a pipe occurs when the fluid close to the wall moves in an opposite direction to that of the core fluid. Reverse flow is established by using a piston-cylinder mechanism, the programmed motion of which imparts a known impulse to the fluid. When the piston is stopped at the end of the stroke, fluid inertia makes the core of the flow to continue in the same direction. In order to conserve mass, reverse flow is established close to the wall. An inflection point is thus formed, leading to flow instability above a critical Reynolds number ¹. Dye and streak flow visualization experiments are performed to highlight the impact of DRP additives (polyethylene oxide, PEO, dissolved in water). The time of onset of the instability and the wavelength of the observed instability are studied in systems with and without DRP additives. This study will provide further insight into the phenomenon of turbulent polymer drag reduction.

¹Das & Arakeri, **J Fluid Mech** / Volume 374 / November 1998, pp 251-283

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