

Abstract Submitted
for the DFD07 Meeting of
The American Physical Society

Turbulent Flow Through 90 Degree Pipe Bends GUANGJUN CAO, METODI ZLATINOV, ALEXANDER SMITS, Princeton University — A fully developed turbulent pipe flow is directed through a 90° bend with two different radii of curvature. Particle image velocimetry (PIV) is used to measure the streamwise and radial components of velocity far upstream, immediately upstream, immediately downstream, and far downstream of the bend. The velocity and vorticity maps from each of the four locations are used to illustrate the progress of secondary motion created by the bend. The number, arrangement and strength of the streamwise vortices created by the bend is analyzed as a function of the Reynolds number, and the ratio of pipe radius to the radius of curvature of the bend. Preliminary results from measurements upstream of the bend show that for Reynolds numbers up to 4000, the fully developed velocity profile is symmetric at a distance of 15 internal pipe diameters upstream of a bend that has a curvature radius ratio of 1, but the flow near the outside wall of the pipe slows down as it approaches the bend. This effect is more important at lower Reynolds numbers. Measurements at higher Reynolds numbers will be reported at the meeting.

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Date submitted: 06 Aug 2007

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