

Abstract Submitted
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Direct measurement of wall shear stress in a backward facing step flow by using a photonic wall shear stress sensor ULAS AYAZ, TINDARO IOPPOLO, VOLKAN OTUGEN, Southern Methodist University — We report direct wall shear stress measurements in a reattaching channel flow. The sensor used to perform measurements is a photonic wall shear stress sensor based on the morphology dependent resonances (MDR) of dielectric microspheres. The wall shear stress acting on a circular movable plate with 1 mm diameter, is mechanically transmitted to a Polydimethylsyloxane (PDMS) microsphere. The applied shear force on the microsphere leads to a shift in the MDRs, thus, by monitoring the MDR shifts, the magnitude as well as the direction of the shear stress are measured. The sensor is calibrated in a two dimensional channel with air flow. For flow separation and reattachment, a backward facing step is introduced into the channel and shear stress measurements have been performed at various distances from the step. Frequency and the magnitude of the shear stress fluctuations at the reattachment region have been recorded and compared to the reported measurements in literature.

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