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Experimental Measurements of Skin Friction in Air and Water Micro-Channels JIM CRAFTON, SERGEY FONOV, GRANT JONES, ALAN FORLINES, Innovative Scientific Solutions, Inc. — Surface Stress Sensitive Film (S3F), is a relatively new experimental sensor that provides continuous measurements of skin friction and pressure on aerodynamic and hydrodynamic surfaces. This sensor is based on the distortions of an elastic polymer film which deforms under the action of the applied normal and tangential loads. Skin friction and pressure gradients are determined by monitoring these distortions and applying a finite element model to the elastic film. This technique has been demonstrated by performing quantitative measurements of pressure and skin friction in several wind tunnels, water tunnel, and channel flows. This paper will focus on experimental measurements in fully developed micro-channels that have been used to validate the S3F measurements. Comparisons between S3F, theoretical relations based on Reynolds number and Poiseuille Flow, and experimental measurements of skin friction based on monitoring the pressure gradient in the channel indicate agreement of better than 5%.

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