

Abstract Submitted
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PIV-based investigation of the skin friction of the flow over random fibrous media PARISA MIRBOD, REZA GHEISARI, Clarkson University — Finite Reynolds number ($Re < 20$) flow over fibrous medium inside a rectangular duct was studied using a planar 2D PIV system. Three different fibrous materials with different porosities were used. Fibrous material lined the bottom wall of the duct along the length of the duct. The flow regime for all tests was laminar, and measurements were all done when the flow reached a steady state. Error and uncertainty sources in the experiments were also discussed. Shear rates were estimated at the surface of the fibrous media. As a conclusion to this study skin friction factor were calculated at the interface of all fibrous media at selected Reynolds number. Then using power function, curve fits with the $C_f = a/Re$ form were found which could closely correlate skin friction and Reynolds number. To weaken the effect of near-wall errors in estimated shear rates and consequently skin friction, an average of shear rate estimation in a layer with thickness of 5 mm was calculated which was used to calculate an average skin friction. Correlations of average skin friction with average Reynolds number were also presented.

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