Abstract Submitted
for the DFD16 Meeting of
The American Physical Society

Velocity measurement of flow over random soft porous media ISREAL SELKIRK, PARISA MIRBOD, Clarkson University — The aim of this work is to experimentally examine the flow over random soft porous media in a three-dimensional channel. Various combination of fibrous material and the morphology of the fibers were chosen to achieve void volume fraction (ε) ranging from 0.4 to 0.7. Care has been taken to keep the Reynolds number low so that the flow was laminar. The channel height was constant, however the thickness of the fibrous media was varied to achieve different filling fraction. Before starting the tests in the duct with fiber arrays, a series of tests in an empty duct (i.e., without fibers) conducted to validate the experimental measurements. We also discussed the error and uncertainty sources in the experiments and described the techniques to improve their impact. We studied detailed velocity measurements of the flow over fibrous material inside a rectangular duct using a planar particle image velocimetry (PIV) technique. Using these measurements, we determined the values of the slip velocity at the interface between the fibrous media and the flow. It was found that values of the slip velocity normalized by the maximum velocity in the flow depend on solid volume fraction, pore spaces, and fraction of channel filled by the fiber layers.

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Date submitted: 01 Aug 2016 Electronic form version 1.4