Abstract Submitted
for the DFD16 Meeting of
The American Physical Society

Visualization of vacuum cleaner-induced flow in a carpet by using magnetic resonance velocimetry[1] JEESOO LEE, SIMON SONG, Hanyang Univ — Understanding characteristics of in-carpet flow induced by a vacuum cleaner nozzle is important to improve the design and performance of the cleaner nozzle. However, optical visualization techniques like PIV are limited to uncover the flow details because a carpet is opaque porous media. We have visualized a mean flow field in a cut-pile type carpet by magnetic resonance velocimetry. The flow was generated by a static vacuum cleaner nozzle, and the working fluid is a copper sulfate aqueous solution. Three dimensional, three component velocity vectors were obtained in a measurement domain of 336 x 128 x 14 mm3 covering the entire nozzle span and a 7-mm thick carpet below the nozzle. The voxel size was 1 x 1 x 0.5 (depthwise) mm3. Based on the visualization data, the permeability, the Forchheimer coefficient and pressure distribution were calculated for the carpet.

Jeesoo Lee
Hanyang Univ

Date submitted: 01 Aug 2016   Electronic form version 1.4