

Abstract Submitted
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DPIV Measurements of Vortex Ring Interaction with Multiple Permeable Screens¹ MUSTAFA N. MUSTA, PAUL S. KRUEGER, SMU — Flow visualization of the interaction of a vortex ring impinging on several parallel, transparent permeable screens was made previously for screens with 84% open area ratio. The results indicated the vortex ring split into smaller vortical structures after its interaction with the first screen and exhibited a continuous break down into increasingly irregular flow after interaction with subsequent screens. The flow did not reorganize into a transmitted vortex ring as was observed with vortex rings impinging on a single permeable screen. The present work seeks to provide a more quantitative assessment of the flow through screens using DPIV. DPIV measurements were made using an aqueous solution that was refractive index matched to the transparent screens. Measurements were made for vortex rings interacting with screens with variable spacing and open area ratios of 58%-84%. The vortex rings were generated with a piston-cylinder vortex ring generator using piston stroke-to-diameter ratios of 2-4 and jet Reynolds numbers of 1000-2000. Preliminary results show splitting and decay of the flow vorticity in agreement with the flow visualization.

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