

Abstract Submitted
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Vortex Ring Interaction with Multiple Permeable Screens¹

MUSTAFA N. MUSTA, PAUL S. KRUEGER, SMU — Previous experiments on the interaction of a vortex ring impinging on single thin permeable screen demonstrated the formation of secondary vortices and a transmitted vortex ring. The present work concerns experimental investigation of the interaction of a vortex ring with multiple permeable screens. Vortex rings are formed by piston-cylinder type vortex ring generator and impinge on an array of parallel, transparent screens. The screens have an open ratio of 84% and the spacing between screens is variable. The vortex rings were formed with an approximate jet Reynolds number of 1300 and a piston stroke-to-jet diameter ratio (L/D) of approximately 4. Dye visualization of the vortex rings shows that they break into multiple vortices after impinging on first screen. The vortices subsequently disintegrate, but the total distance required for disintegration is relatively unaffected by the number of screens through which the vortices pass due to the regular structure of the screens. It is also observed that the location of the initial vortex ring axis relative to the screen rods has a significant effect on the vortex breakup and disintegration process.

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