

Abstract Submitted
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Impact of Cyclical Pulse Behavior on Toroidal Vortex Interaction¹ LOUIS SALMON, Louisiana Tech University, JOHN BAKER, The University of Alabama — Vortex rings formed by impulsively started jets have been of great interest due to the possible applications to underwater vehicle propulsion and as a means of inducing fluid flow. So far, most research into vortex rings has only investigated the shedding of a single vortex ring at different formation numbers. This study investigated the behavior of vortex rings and the effects on the circulation when two vortex rings were shed one after the other from the same impulsively started jet. The computational fluid dynamics software ANSYS Fluent was used to perform this study. The geometry for the study was that of a pipe exiting into a volume of quiescent fluid and the impulsively started jet was modeled as a square wave velocity profile at the inlet of the pipe. The computational model was validated for a single vortex ring by comparing circulation data obtained to that found in previously published research. Once the model was validated, an analysis of vortex ring interaction was performed. This study considered formation numbers in the range of 1 to 4. The results showed that the second vortex ring either did not form or merged with the first vortex ring depending on the conditions. The combined vortex ring was found to have an increased circulation and an elongated shape.

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