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Direct interaction of fluid-to-fluid in an unsteady ejector with a zero-degree conning radial diffuser

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Abstract
Unsteady ejectors have been investigated as advanced technologies to classical ejectors for the purpose of energizing secondary fluids whereby the attractiveness of these devices lies in their mechanical simplicity. The primary fluid is accelerated to Mach 2 utilizing eight rectangular supersonic nozzles. The geometry of the diffuser where the primary and secondary fluids interact and hence exchanging energy is considered to be an important factor in affecting the performance. Specifically, proper design of the diffuser contributes significantly for producing quality flow; e.g., reducing the likelihood of developing shocks, and hence less of entropy generation, which is an indication for degrading the potential for energy exchange. The diffuser is chosen to be upright, or zero-degree conning, thus allowing the two fluids to smoothly come into contact. Because of their prime potential application being in thrust augmentation and refrigeration the working fluid was chosen to be water vapor, which is more suitable with the later application. A CFD package; i.e., FLUENT, was employed for the investigation.