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Optical measurement of the interaction between outwardly oriented, steady gas jets[1] FRANK AUSTIN MIER, SIMONE HILL, MICHAEL HARGATHER, New Mexico Tech — Nearby gas jets issuing into a quiescent environment interact with each other in various manners dependent on their relative spacing and orientation. While the study of a single turbulent jet is classical to fluid dynamics, and entrainment between parallel jets at varying spacing has been quantified, this investigation aims to determine how an outward projection will affect the jet interaction. Here, Particle Image Velocimetry (PIV) and high-speed schlieren imaging are performed to characterize this interaction. An experiment was designed to produce steady gas venting through custom orifice plates at a range of choked and un-choked stagnation pressures. Orifice plates produced jets offset at incremented angles from 0° to 60°. Downstream jet interactions are analyzed through the measured PIV velocity field and flow feature observations from high-speed schlieren images. The velocity profile findings are compared to the well-defined parallel jet case. This work provides a fundamental understanding of the flow structure and velocity field of outwardly directed jets with broad potential application, including the external fluid-dynamics of lithium ion battery venting failures.

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Michael Hargather
New Mexico Tech

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