

Portfolio

Effect of a Neighboring Sonic Jet on the Shock Structure of a Sonic Jet

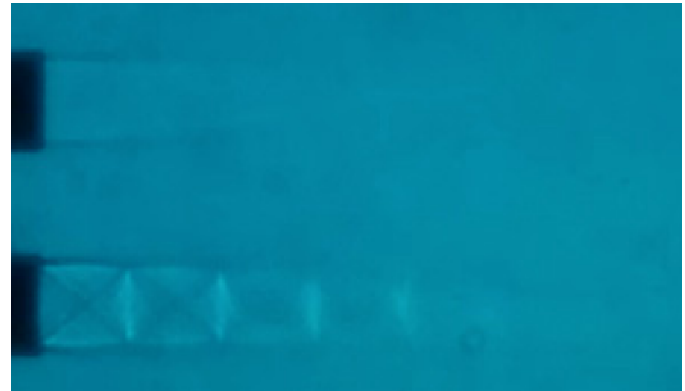
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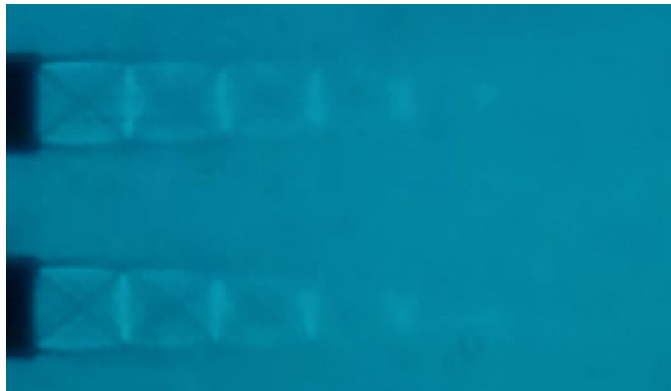
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(a) Top nozzle NPR 0, bottom nozzle NPR 3



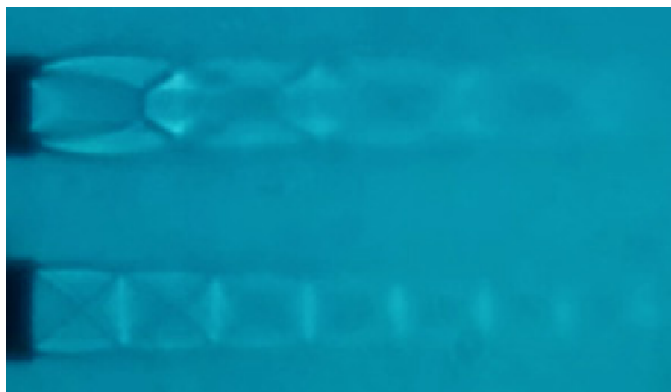
(b) Top nozzle NPR 1.89, bottom nozzle NPR 3



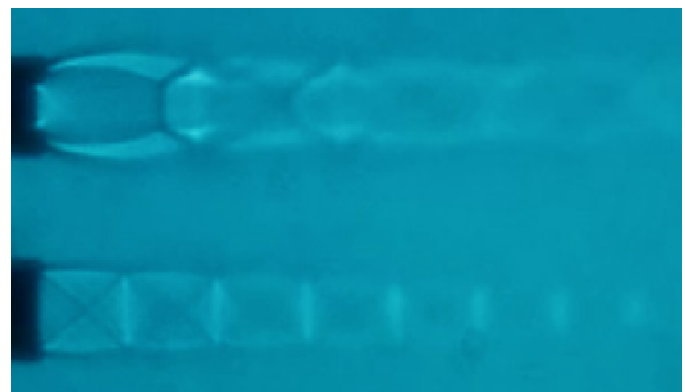
(c) Top nozzle NPR 3, bottom nozzle NPR 3



(d) Top nozzle NPR 4, bottom nozzle NPR 3



(e) Top nozzle NPR 5, bottom nozzle NPR 3



(f) Top nozzle NPR 6, bottom nozzle NPR 3

The shadowgraph pictures show the changes in the shock-cell structure of a sonic jet of a fixed nozzle pressure ratio (NPR) due to a near by sonic jet at different NPR. Two identical axi-symmetric convergent nozzles of exit diameter (D) 10 mm, placed with centre-to-centre distance of $2.4D$, were used in the experiments. The nozzles were connected to individual stagnation chambers so as to maintain different NPR for each nozzle. The NPR of the bottom nozzle was kept constant at 3. The top nozzle NPR was varied from 0 to 6.

The bottom jet shock-cells are influenced for top jet NPR 1.89, 3, and 4. For the top jet NPR 5 and 6 the bottom jet shock-cells are almost identical to the no flow condition in top nozzle. There is almost no change in the first 3 shock-cells for all the combinations tested. The maximum influence is observed for top jet NPR 3. The change in the shock-cells in the bottom jet is due to interaction of acoustic fields which depends on the expansion level of the jet, resulting in the modification of the acoustic feedback loop.