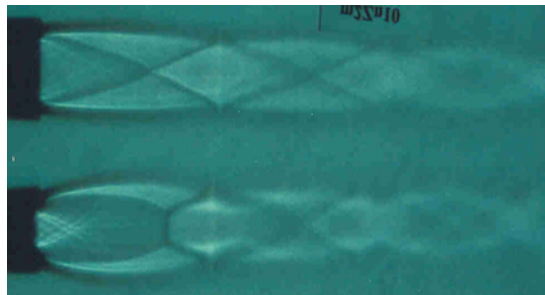


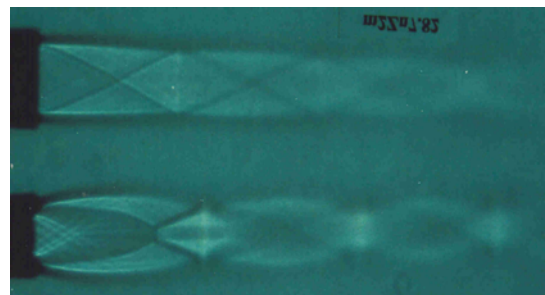
## Visualization of Supersonic Unequal Mach Number Twin Jet

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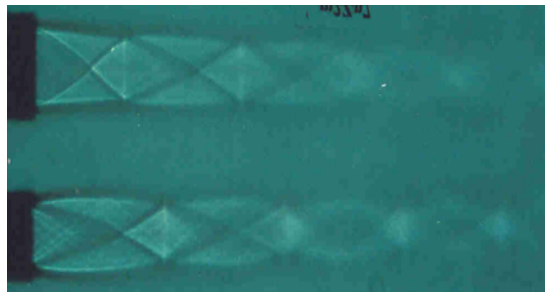
<sup>1)</sup> Department of Aerospace Engineering, Indian Institute of Technology Kanpur, India.



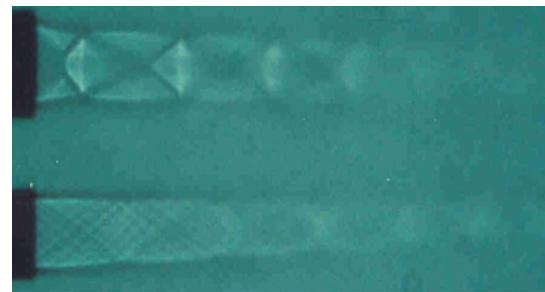
(a) NPR 10



(b) NPR 7.82



(c) NPR 6



(d) NPR 4.12

The above shadowgraph pictures show the shock structure of an unequal Mach number supersonic twin jet. Axi-symmetric nozzles of Mach number 2.0 (top nozzle) and 1.58 (bottom nozzle) were used in the experiments. The throat diameter of both the nozzles was kept as 10 mm. These nozzles were fed by the same stagnation chamber so that the expansion levels of the jets were different. The correct expansion nozzle pressure ratio (NPR) for Mach number 2.0 and 1.58 nozzles are 7.82 and 4.12, respectively.

The acoustic and flow fields of supersonic jets depend on their expansion level. The interaction of the acoustic and flow fields of the jets can change the acoustic feedback loop, convective Mach number which changes the jet characteristics such as mixing, and noise generated from the jet. In addition to these, the noise from the jet is made to refract and diffract by the neighboring jet flow field which offers a shielding effect in preferred direction. The interaction of the unequally expanded supersonic jets in twin jet can be used as control to modify the jet characteristics.