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Interaction of two opposite conical curved wall jets

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Abstract: An experimental investigation of a conical flow formed by the interaction of two asymmetric turbulent curved wall jets past a circular cone is presented. Measurements were made of velocity and turbulence intensity profiles of the two jets in the wall jet, the interaction, and the merged jet regions. The location of the interaction region of the two opposing curved wall jets and the flow direction of the merged jet were found to depend primarily on the ratio of the slot exit velocities of the two jets. The mean velocity and streamwise turbulence intensity profiles of the merged jet were similar to those in a turbulent free jet. Regardless of jet-exit velocity ratios, self-similar mean velocity profiles for different values of downstream location prevails up to the beginning of interaction region . The streamwise and lateral turbulence intensities increase with increasing the streamwise distance up to the interaction region, where the turbulence behavior becomes random and is characterized by larger peak values of the turbulence intensity compared to wall jet region. The maximum velocity decay and jet halfwidth growth increased parabolically with streamwise distance. No significant effect of conical shape was observed. Surface flow visualization was carried out for several exit jet velocity ratios. Three dimensionality was seen to be reduced as the secondary jet momentum increases.