

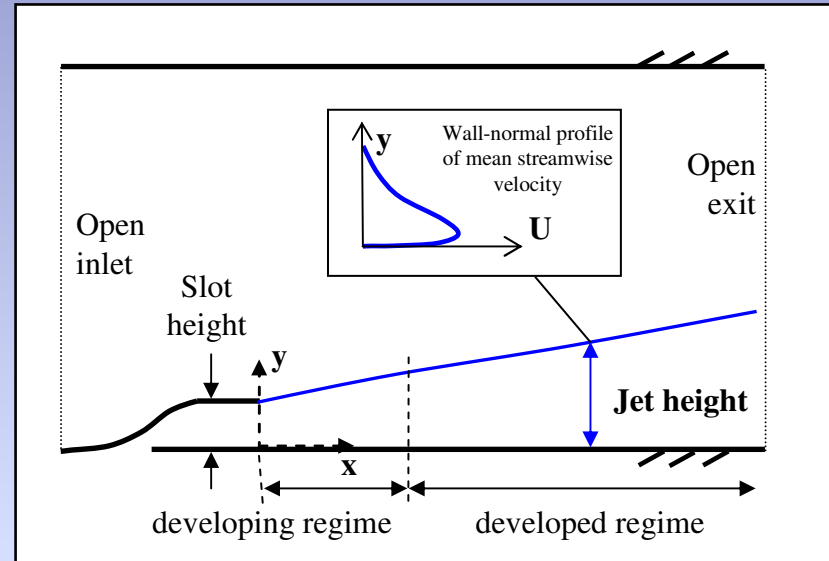
A COMPARATIVE STUDY OF PLANE AND RADIAL TURBULENT WALL JETS

Background

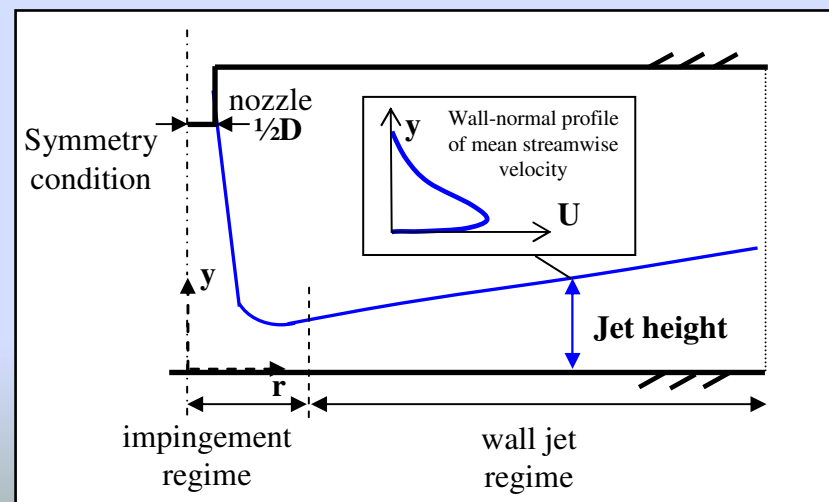
Wall jets are used in plane or radial configurations to promote heat/mass transfer from a wall. Since the plane wall jet is physically more compact than the radial wall jet arising from an orthogonally-impinging jet, it can be useful to approximate the latter with the former.

Objective

Investigate the similarity between plane and radial turbulent wall jet flow characteristics.



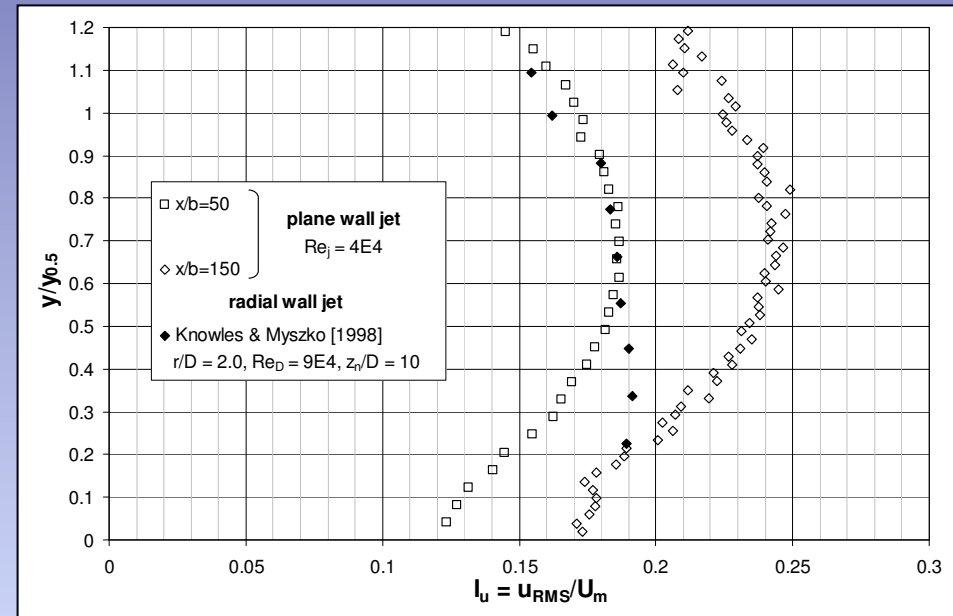
Plane wall jet configuration



Radial wall jet configuration

Research Carried Out

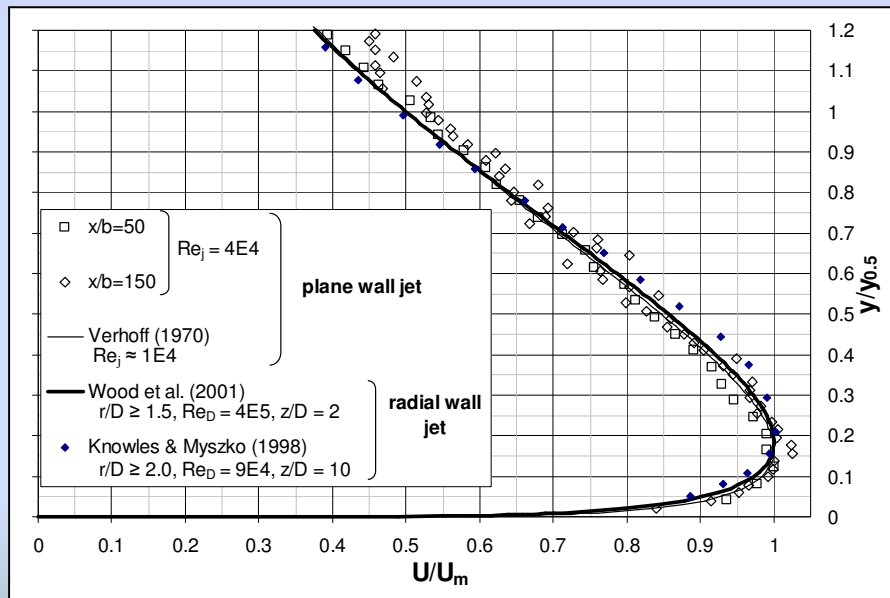
- Design and construction of a plane wall jet test facility.
- HWA measurements in aforementioned facility.
- Comparison of mean and turbulence quantities with the radial wall jet literature.



Normalized normal-to-wall profiles of streamwise turbulence intensity

Key Findings

Mean velocity and turbulence discrepancies between a developed plane wall jet ($x/b \geq 50$) and a developing radial wall jet ($r/D < 4.5$), are within experimental measurement uncertainty ($< 9\%$).



Normalized normal-to-wall profiles of streamwise mean velocity