

## PROJECT INTRODUCTION

### Objectives

To investigate the vortex structure in the jet from notched circular nozzles and validate the vortex structure of numerical simulations by comparing the results with experiments.

### Project Investigator / Manager

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### Period of Project

01 May 2005 – 30 Nov 2005

### Website

[www.temasek-lab.nus.edu.sg](http://www.temasek-lab.nus.edu.sg)

### Abstract

Uses jet flow simulation to understand the detailed dynamics of jet entrainment and mixing, which is of fundamental importance to various applications such as noise suppression, combustion, heat transfer and chemical reactors.

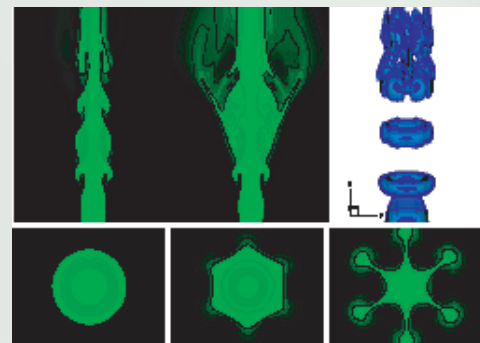
## PROJECT DETAILS

### Description

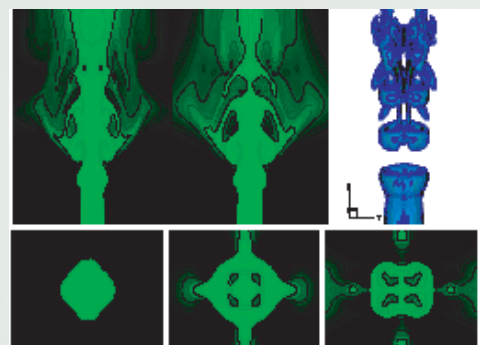
Jet flow has been the hot study topic for many years. Vortex evolution and interaction are distinct characters of jet flow. Numerous experimental and numerical investigations have been carried out to demonstrate the influence of the jet outlet geometry on the jet vortex structure. Compared with active means of jet control, the advantage of passive means of jet control by jet exit geometry altering is efficiency, reliability and simpleness of nozzle design.

In the present project, the laminar vortex flow ( $Re=4000$ ) in jets from notched circular nozzles will be investigated using numerical method. The nozzles concerned are normal circular nozzle (C-nozzle), V-shape notched nozzle (V-nozzle) and A-shape notched nozzle (A-nozzle) with same circular cross-section and two peaks and two troughs at the outlet of the nozzle. The vortex dynamics resulting from this difference notched circular nozzles is visualized by using a newly developed numerical dye visualization technique. The numerical dye visualization results of vortex flow structure in V-nozzle will be compared with the flow structure obtained by experiment using laser-induced fluorescence techniques.

Understanding the detailed dynamics of jet entrainment and mixing is of fundamental importance to various applications such as noise suppression, combustion, heat transfer and chemical reactors.



*Flow from C-nozzle*



*Flow from V-nozzle*