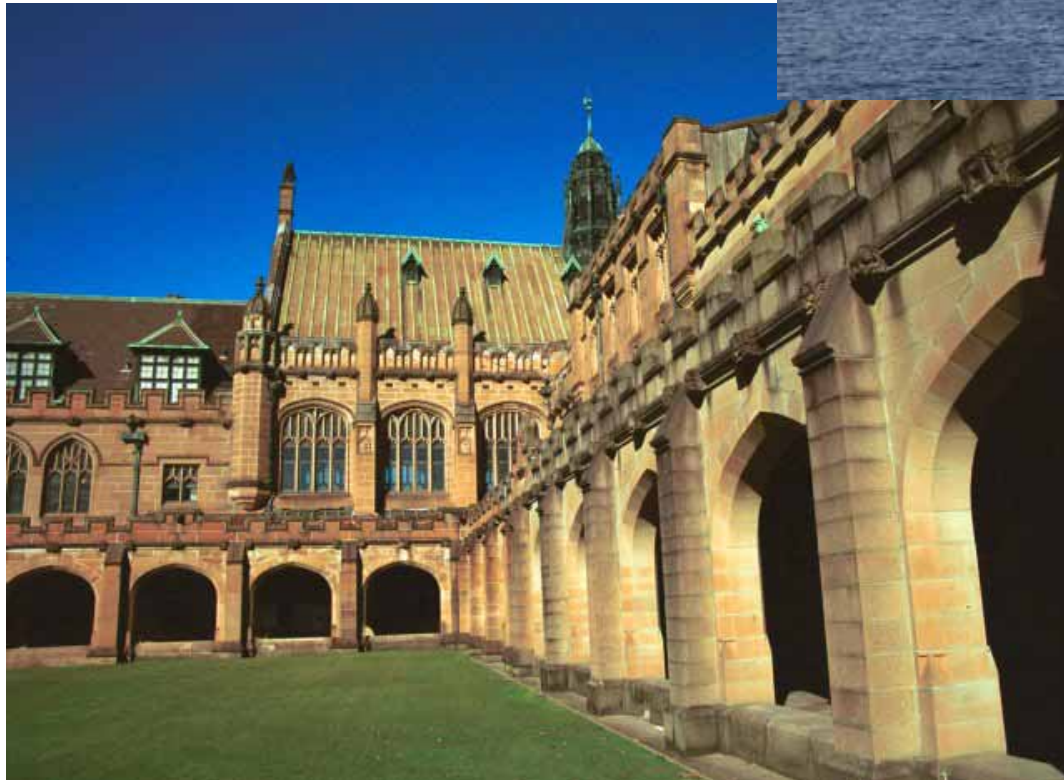


**Collaboration**  
**with**  
**Australia**



**Masud Behnia**  
**Dean of Graduate**  
**Studies**  
**The University of**  
**Sydney**

# *Why Australia ?*

- **Safe Destination**
- **Value for money**
- **English is the national language**
- **Ideal study environment**
- **Friendly, warm people**
- **Beautiful beaches, unique landscapes**
- **Native flora and fauna**
- **Cultural diversity**

# The University of Sydney

*Australia's First University*





## A view over the Main Campus





The Quadrangle

# *Research Funding in 2006*

**The University of Sydney - 15%**

**The Australian National University - 12%**

**The University of Melbourne - 8%**

**The University of Queensland - 11%**

**The University of New South Wales - 9%**

**Monash University - 8%**

**The University of Western Australia - 5%**

**University of Adelaide - 4%**

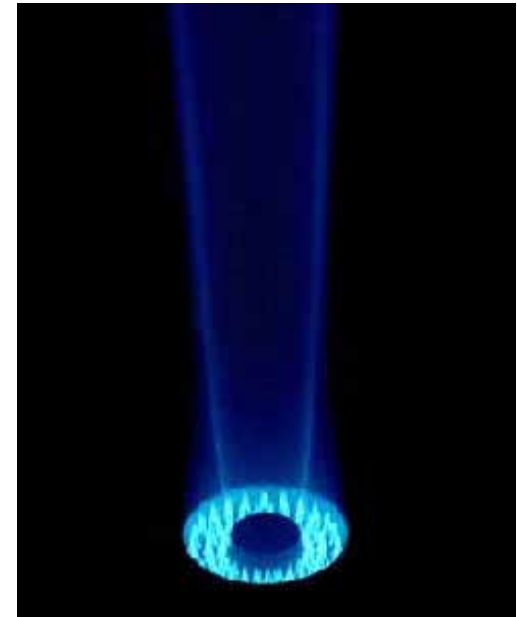
**All other universities - 33%**



# Overview of Projects for Collaboration

## Research Areas

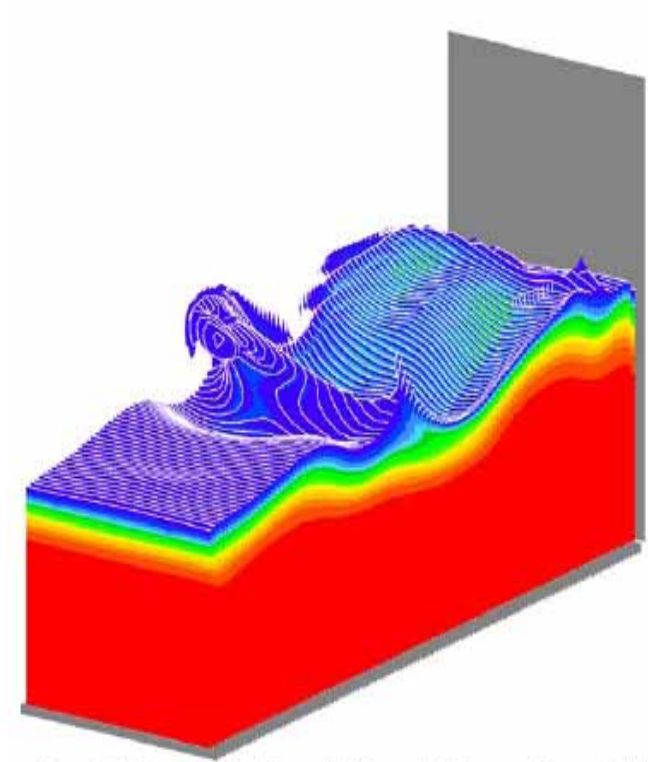
- Key Thermo-Fluids Research Areas
  - Combustion (experimental and numerical work, turbulent premixed, spray, emissions)



# Overview of Projects for Collaboration

## Research Areas

- Key Thermo-Fluids Research Areas
  - Combustion (experimental and numerical work, turbulent premixed, spray, emissions)
  - Fluid Dynamics (Natural convection, environmental flows, turbulence modeling ...)





# Overview of Projects for Collaboration

## Research Areas

- Key Thermo-Fluids Research Areas
  - Combustion (experimental and numerical work, turbulent premixed, spray, emissions)
  - Fluid Dynamics (Natural convection, environmental flows, turbulence modeling..)
  - Aerospace Engineering (stability, control, DSMC, Evolutionary Optimisation)



# Overview of Projects for Collaboration

## Research Areas

- Key Thermo-Fluids Research Areas
  - Combustion (experimental and numerical work, turbulent premixed, spray, emissions)
  - Fluid Dynamics (Natural convection, environmental flows, turbulence modeling ...)
  - Aerospace Engineering (stability, control, DSMC, Evolutionary Optimisation)
- Other Research Groups
  - Materials and Rheology, Biomedical
  - Mechatronics and autonomous vehicles
  - Manufacturing and vehicle design ...

# Overview of My Projects for Collaboration

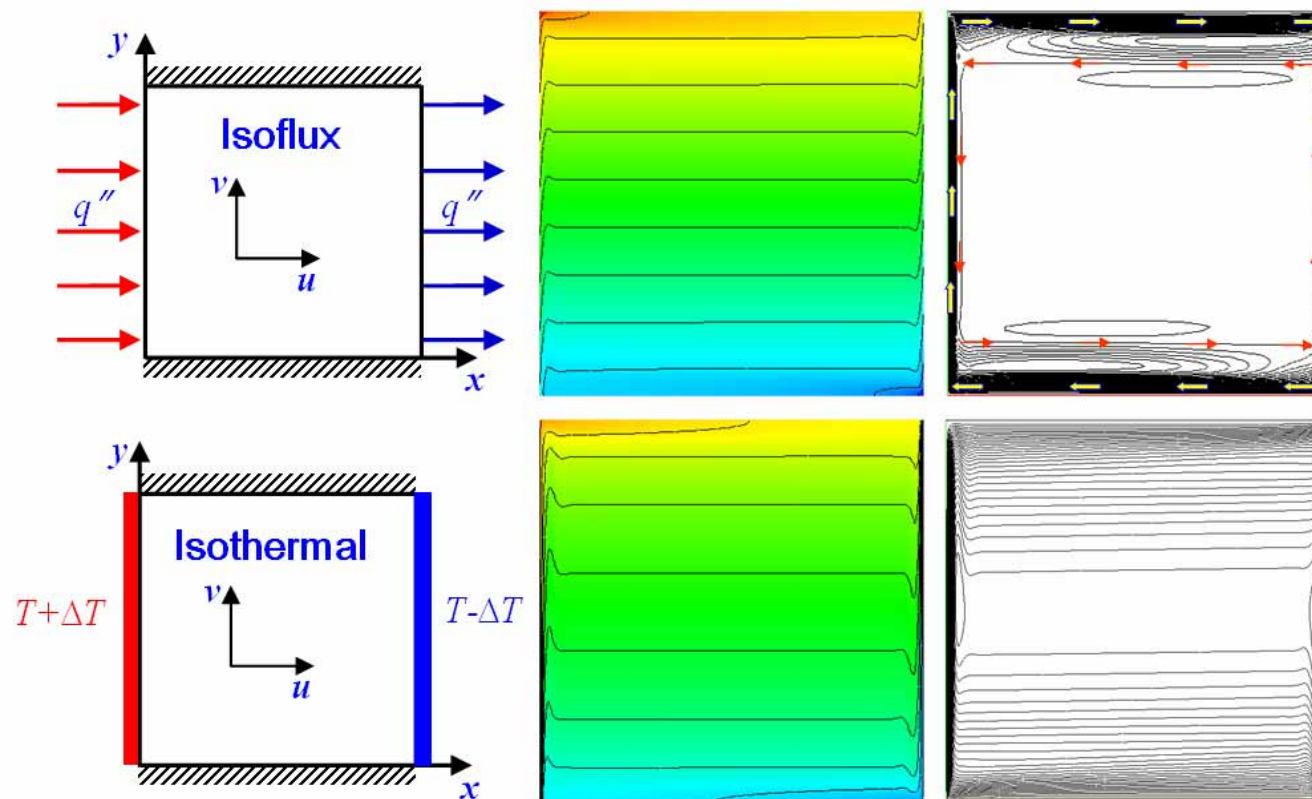
- Major Themes – Convection & Radiation Heat Transfer Studies
  - Fundamental
  - Applications
    - Natural Convection
    - Cooling Towers
    - Cooling of Electronics
    - Laputa Project



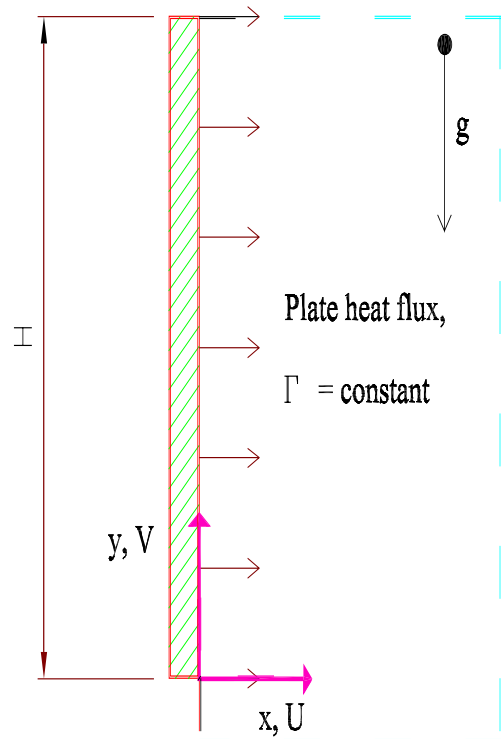


# Study a Natural Convection Flow in Isoflux Heated Cavity

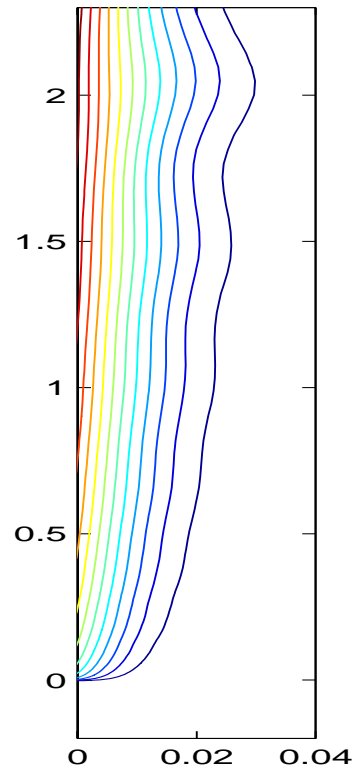
- Investigate the flow behavior, the scaling results, stability characteristics and compare to those of the isothermal cavity.



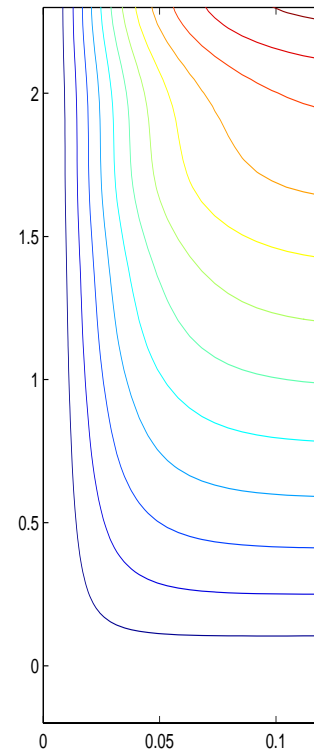
# “Boundary Layer Stability Analysis of Natural Convection on a Vertical Plate Using DNS”



Flow Schematics



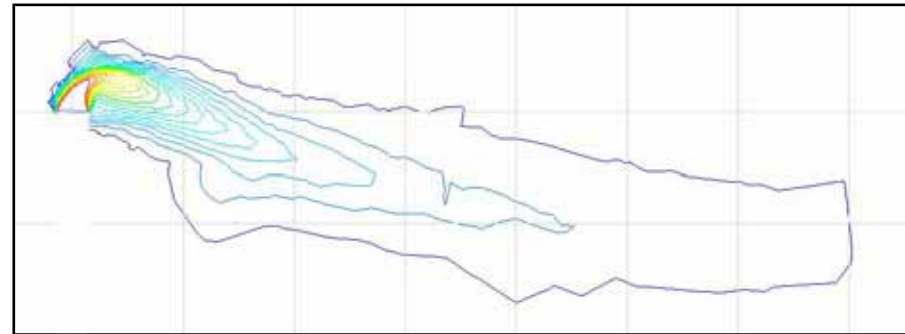
Isotherms



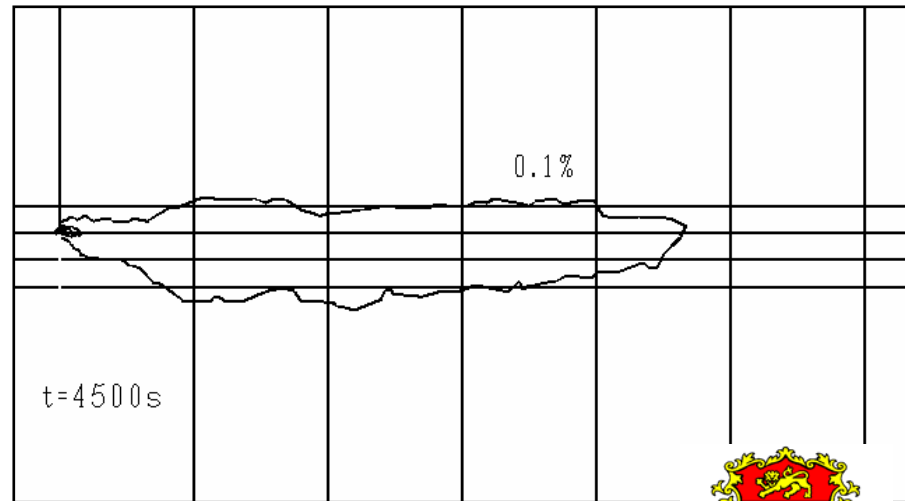
Streamlines

# Nutrient transport from an artificial upwelling of deep ocean water (the Laputa Project)

- Negatively buoyant plume in stratified environment under cross-flow conditions
- Cross flow is very strong compared to the upwelling
- Negatively buoyant plume in stratified environment under cross-flow conditions



Nutrient contours 10m from pipe outlet (2% of initial concentration)



Nutrient contours 50m from pipe outlet (0.1% initial concentration)



Rapid Diffusion of Heat and momentum

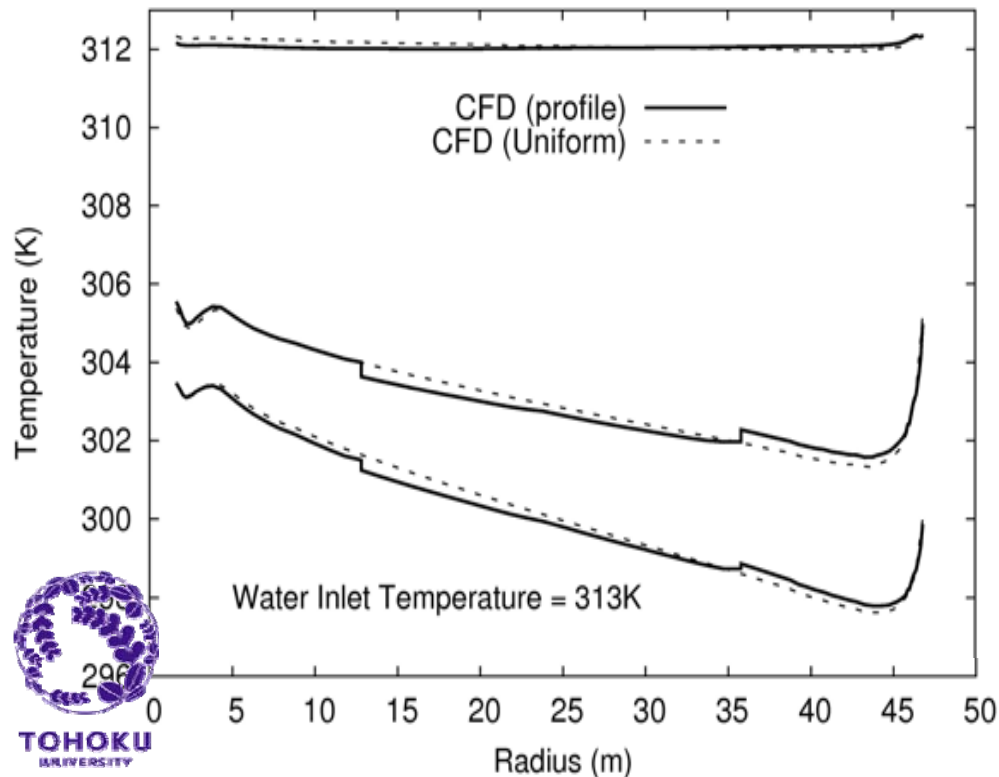


The University of Sydney

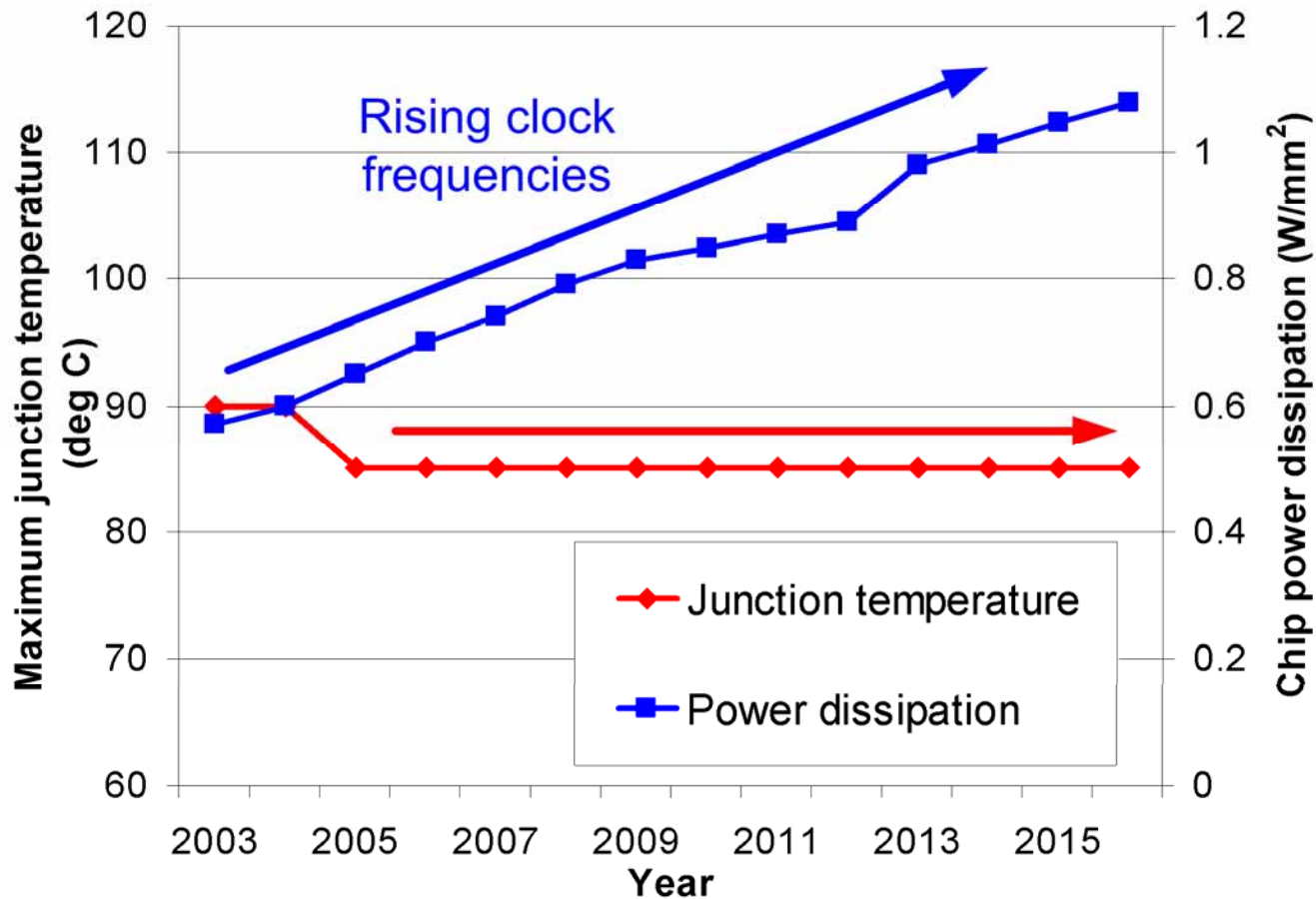


# Optimisation of A Natural Draft Wet Cooling Tower

- Large Horizontal Gradient of Heat Transfer
- Annular Profile of Air flow and Water temperature
- Optimise fill depth and water distribution to achieve higher overall cooling



# Cooling of Electronic Components



Advanced cooling methods required for low cost consumer applications



Chip power densities increase

Data shown is for cost-performance sector  
[International Technology Roadmap for Semiconductors 2003]

# Collaboration-How can we do it?

- We need good innovative projects
- Grass root contacts & collaboration
- Respect for and understanding of cultures
- Flexibility in project development and direction
- Support for PG students
- The value proposition is not only in research finding but networking and friendship
- Develop joint degrees (cotutelle)

Let us **not forget that it must be fun!**