

Report for Graduate Student Exchange Program based on the Academic Exchange Agreement

10/03/2014

Name

PRIAUX LOUIS



Affiliation and Supervisor

Professor F.Lefevre

INSA Lyon

Supervisor of IFS

Professor S.Maruyama

Research Period

04/2014-08/2014

Research Theme

Natural convection in enclosures

Research Results etc.

The research has been led on the open source toolbox Openfoam. The Boussinesq approximation have been used in a square cavity filled with air. The objectives consisted into modeling a two dimensional and then a three dimensional natural convection phenomena in such cavity. After comparing the validity of the model with the results found in the literature, the influence of parameter such as the Rayleigh number of the precision of the used mesh have been investigated. To be more precise, Rayleigh number from 10^3 to 10^7 have been studied, and grid size increasing to 150 cells per directions have been used.

This research enabled to find, with different means, results that have been found on specific cases of natural convection in enclosures by other researchers.

Basic results concerning 2D and 3D cubic cavity filled with air have been checked, and the influence of the Rayleigh number have been underlined.

A quick study about the influence of the grid size have been done as well, and also a quick comparison between the use or the absence of a turbulent LES model for quite middle high Rayleigh cases has been done as well.

Comments to this program

I would really recommend such an exchange program to any other students interested in a great research experience.

This program enables me both to get to know about the research work in general, and to improve my specific skills in the domain I worked on.

In addition, such an experience in Japan was really enriching thanks to the great help of the lab member, and the exchanges with the professors and the students of Tohoku University.

Supervisor of IFS (Professor S.Maruyama)

During Mr. Priaux's internship period, he has conducted the research project on numerical analysis on 'Natural Convection in Enclosure'. He had scientific skills and an ability to work in numerical computation environment. He understood the research project and showed his genuine motivation with focusing on producing fruitful result.