

COE-INES Business Trip Report

Meetings attended: 11th IRIS Meeting + 5th International Conference on Nuclear option in Countries with Small and Medium Electricity Grids.

Location: Dubrovnik, CROATIA

Person attending: 原子核工学専攻博士後期課程 2年 Emilio Baglietto

Dates: 18-24 May, 2004

1. 5th International Conference on Nuclear option in Countries with Small and Medium Electricity Grids.

May 16-20, 2004 Dubrovnik, CROATIA – The 5th International Conference on the



Fig. 1- The city of Dubrovnik

Nuclear Option in Countries with Small and Medium Electricity Grids (5th HND Conference) was held in the beautiful city of Dubrovnik, which is situated at the south of the Republic of Croatia. Dubrovnik was founded in the first half of the 7th century and has survived a complicated history and in particular the brutal attack on October 1, 1991 by the Serbo-Montenegrin army.

The conference was devoted to the needs and interests of countries with small or medium nuclear systems and electricity grids. It has been discussed of the nuclear option from the point of view of resources, costs, technological, organizational and educational requirements, and environmental advantages. It has also focused on the matters related to the operational safety, fuel cycle, waste management and decommissioning. The important goal of the Dubrovnik 2004 conference has been to serve as a forum to promote regional co-operation and exchange of experience in use of nuclear power and fuel cycle facilities among small or medium-sized European countries with an interest in nuclear option.

On the last day a special session has been held devoted to the IRIS reactor. In this occasion 7 papers on the IRIS Safety and Design have been presented and discussed.

2. 11th IRIS Team Meeting.

May 20-22, 2004 Dubrovnik, CROATIA – The 11th IRIS Team meeting was held immediately after the 5th HND. The previous meeting had been held in Nara in the October of 2003. The International Reactor Innovative and Secure (IRIS) is an advanced, Generation IV, light water reactor being developed by an international consortium of industry, laboratory, university and utility establishments, led by Westinghouse. The Ninokata Laboratory is an active member in this project.

During the 2 yearly meetings the status of all the different tasks is presented and comprehensively discussed by all members, to assess the present level and plan the future developments. In particular the Laboratory is responsible for the development of an ultra-long life core design for future reloads of the reactor, together with the development of advance turbulent models for Computational Fluid Dynamics (CFD) simulations of the reactor.

2.1. Presentation to CFD Group and Discussion

During the first day of the meeting a special CFD Technical Group Meeting has been held to discuss the turbulence model that I have developed at the Research Laboratory for Nuclear Reactors, with the support of the COE-INES Program. My presentation has been held and discussed among the CFD group members. Dr. Luca Oriani and Larry Conway were present for the Westinghouse Company, Prof. Marco Ricotti and Dr. Lelio Luzzi were present for Milan University together with Prof. Ninokata and myself, Emilio Baglietto, for the Tokyo Institute of Technology.

A very comprehensive presentation was given starting from a review of the original purposes of the work and underlying in the particular where and how the newly developed model can produce clear advantages and is strictly necessary. For this reason the model development has been illustrated showing the remarkable accuracy improvements gained in the simulation of flow cases of high interest for the IRIS development (e.g. internal flows in the presence of separation encountered in hydraulically driven control rods shown in Fig. 2.).

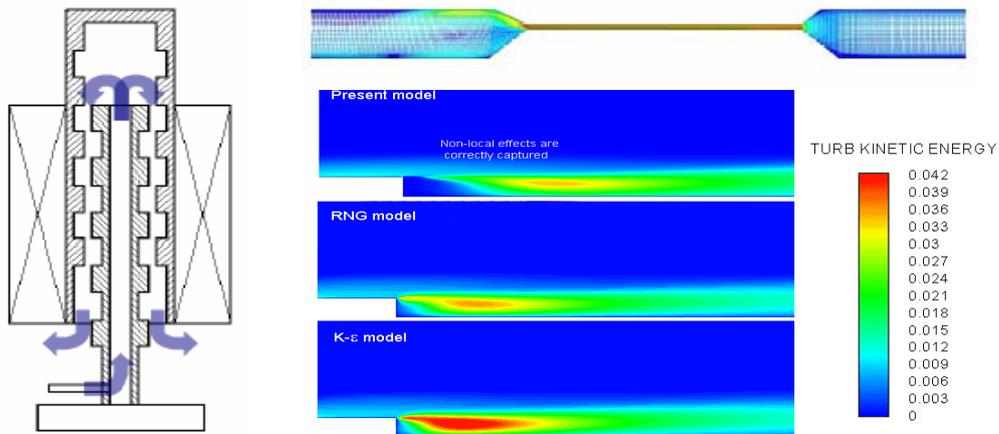


Fig. 2 - Flow simulation in the presence of separation and hydraulically driven control rods application.

Furthermore the successful application of the new model to the simulation of coolant flow inside Innovative Fuel Design of arbitrary shape has been presented, which has been one the most important achievements and driving motivation of the work.

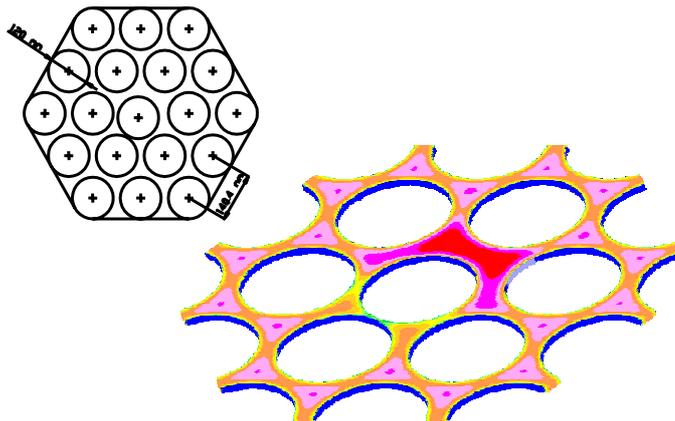


Fig. 3 - Coolant flow distribution inside a tight lattice bundle under geometrically disturbed conditions.

The CFD team members have given enthusiastic comments to the presentation. The model presented by the laboratory (Baglietto and Ninokata, 2003) has been highly appreciated and this has led to the decision of discussing with the FLUENT

developing team in Lebanon, USA for the possibility of including it into the main code. The conclusions from the CFD Working Group have been presented and discussed on the final meeting day together with the conclusions from the other groups.

[1] E. Baglietto, H. Ninokata, 2003. "Selection of an Appropriate Turbulence Modeling in a CFD code for an Ultra-long Life Core for the "IRIS" Reactor", *proceedings of Global 2003, ANS/ENS Winter Meeting*, New Orleans, USA, November 16-20.