

## **Final Report for DAAD Program**

As a senior PhD. Student, it's my honor of having a chance to study in Germany before I finish my degree to broaden my view on academic career. I heard of DAAD program from Prof. Cheng Xu of KIT (Karlsruhe Institute of Technology) firstly, and then I consulted with the teachers of International Department of KIT. Luckily, I found there's a collaborative project between KIT and the Shanghai Metropolitan Region in DAAD programs. So, as a student from Shanghai Jiaotong University, I applied for the program, Strategic Partnerships for Joint Innovations-KIT in the Jiangsu Province and the Shanghai Metropolitan Region, with the help of Prof. Cheng and the teachers of International Department.

I studied at IFRT (Institute for Fusion and Reactor Technology) of KIT. IFRT is a well-known research institute about nuclear safety, advanced nuclear systems and thermal-hydraulics. My PhD. research is about numerical modeling study on two-phase boiling flow under the condition of different pipe orientations, and the object of my research is ERVC system. As we all know, nuclear safety is an essential topic which has been paid high attention to in the field of nuclear engineering all the time, especially in recent years more and more stringent safety criteria is required. ERVC system, the object of my research, which is short for External Reactor Vessel Cooling, has been adopted widely as one of effective severe accident management strategies in advanced PWRs (eg. AP1000, APR1400). At IFRT the majority of my research is focused on the subcooled boiling two-phase flow in horizontal and vertical upward pipe orientation while rare information is available on the behavior of two phase flow in upward inclined pipes. This research content is an important step for my PhD. study. To explore and discuss this issue, I took about one month to do some literature review firstly, and then I chose some top-class performing correlations applicable to ERVC condition, and added them into OpenFOAM code in C++ language, at last these correlations were verified by comparing with some experimental data.

I have gotten a lot of help from the colleagues in my research. Though I don't have any knowledge about German language, there's no any difficulties about our communication while working with them. Moreover, I've had a great opportunity to study following a kind, brilliant supervisor, Prof. Cheng. He instructed my study patiently. I had one or two meetings per week with my supervisor to report my progress and discuss about the problem I met. And group meeting is held once per week regularly, at meeting there are one or two colleagues to introduce their research. It provides a good chance for me to know more about others' research to expand my academic knowledge. Besides group meeting, there's a coffee break every afternoon, all of colleagues get together to have a talk extensively, about culture, history, recent news and so on.

Karlsruhe, where IFRT is located, is a city in southwest Germany, near the French-German border. People there are very nice and friendly. When I just arrived there, I was not familiar with some rules in life, they all told me enthusiastically as soon as I asked people around me. Even sometimes my neighborhood would receive the parcel for me. All of the help make me feel warm in Germany. In some weekends, I went to Karlsruhe Stadium to watch football games, went hiking around Karlsruhe, or visited some other cities near Karlsruhe, like Stuttgart, Heidelberg. During holidays I went to Munich with my friends. I enjoyed the beautiful view of the Königssee and the New Swan Castle, and we also visited Allianz Arena. And I was so lucky enough to experience German traditional activity, Christmas Market and traditional drink, Glühwein. Another impressive thing is the way to celebrate graduation of PhD. Student in Germany. Colleagues make an interesting, meaningful hat together for that PhD. Student in advance, and on that day PhD. Student will wear that hat after finishing his thesis defense, even more, sitting in a decorative cart to walk around in campus.

Overall I had an unforgettable, wonderful experience in Germany. Germany is a beautiful and attractive country. DAAD Program is really a recommendable option for anyone who hopes to have an international research experience. At last I must express my gratitude to DAAD Program and all of people who helped me in Germany.

Di Jin