

CFD simulation of natural convection in open pool reactor cooling system

ABSTRACT

One of the most prevailing issues in the operation of Nuclear Reactor is the safety of the system. Worldwide publicity on a few nuclear accidents as well as the notorious Hiroshima and Nagasaki bombing have always brought about public fear on anything related to nuclear. Most findings on the nuclear reactor accidents are closely related to the reactor cooling system. Thus, the understanding of the behavior of reactor cooling system is very important to ensure the development and improvement on safety can be continuously implemented. This study attempted to simulate the natural convection cooling inside an open pool research reactor. The study on natural convection with similar configuration using CFD is rarely conducted, therefore, this investigation will help further in understanding the phenomenon. The results reveal the flow regimes, temperature profile and the formation of the natural convection. The model with pure conduction has also been simulated and compared with the natural convection model. The result shows that natural convection could increase heat transfer process in the reactor pool.

Keyword: Natural convection; CFD simulation; Nuclear reactor safety