

## Accepted Manuscript

Flow mixing and heat transfer in nuclear reactor vessel with direct vessel injection

Yu Weng, Haitao Wang, Benan Cai, Hongfang Gu, Haijun Wang

PII: S1359-4311(17)30827-X  
DOI: <http://dx.doi.org/10.1016/j.applthermaleng.2017.07.040>  
Reference: ATE 10707

To appear in: *Applied Thermal Engineering*

Received Date: 7 February 2017  
Revised Date: 19 June 2017  
Accepted Date: 4 July 2017

Please cite this article as: Y. Weng, H. Wang, B. Cai, H. Gu, H. Wang, Flow mixing and heat transfer in nuclear reactor vessel with direct vessel injection, *Applied Thermal Engineering* (2017), doi: <http://dx.doi.org/10.1016/j.applthermaleng.2017.07.040>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



# Flow Mixing and Heat Transfer in nuclear reactor vessel with Direct Vessel Injection

Yu Weng, Haitao Wang, Benan Cai, Hongfang Gu, Haijun Wang\*

Xi'an Jiaotong University

\*Corresponding author:

Tel: +86 29 82667034; fax: +86 29 82669033;

E-mail: whj@mail.xjtu.edu.cn (Haijun Wang)

Address: State Key Laboratory of Multiphase Flow in Power Engineering, Xi'an Jiaotong University, Xi'an 710049, China

## Abstract

A 1400MW pressurized-water reactor has adopted a special direct vessel injection (DVI) structure for the emergency core cooling system. This design makes the flow mixing and heat transfer in the reactor vessel very complicated and is very different from the traditional structure. This study focused on flow mixing and heat transfer capability in the reactor vessel under different injection conditions. The computational fluid dynamics method and two reference experiments were used. The research presents a numerical way that can provide sufficient accuracy. The DVI deflector was proved to protect the reactor internals from direct scouring by cold injection liquid, as designed. A key area was identified on the reactor vessel surface, where the heat transfer quantity and temperature gradient were obviously higher. And the dimensionless temperature and heat transfer capability were obtained at the reactor vessel. Such data can be used in future real scale reactor design. The study complements the research in understanding

Download English Version:

<https://daneshyari.com/en/article/4991214>

Download Persian Version:

<https://daneshyari.com/article/4991214>

[Daneshyari.com](https://daneshyari.com)