

RELAP5/MOD3.2.2

MARS 1.3.1

**Improvement of MARS 1.3.1 T/H Models through the Implementation of RELAP5/MOD3.2.2 New Features**

, , ,

150

MARS RELAP5/MOD3.2.2

가 PSI (Reflood) , (CHF) ,

(time step control) flow anomaly

MARS . MARS

RELAP5/MOD3.2.2 - MARS

RELAP5/MOD3.2.2 가

**Abstract**

*The improved models in RELAP5/MOD3.2.2 have been adopted to improve the one dimensional module of MARS code. These models are new PSI reflood model, new CHF model of Czech, improved time step control model, and other corrections to reduce the mass error and flow anomalies. Validation calculations are performed with the comparison of RELAP5/MOD3.2.2 calculations to verify the model implementation to MARS code. It has been verified that the implementations of new model and correction for MARS improvement have been done successfully.*

**1.**

RELAP5 MOD3 1985 RELAP5/MOD2 NRC ICAP

(International Code Assessment and Application Program) 가

RELAP5/MOD3.2.2[1]

RELAP5/MOD3.2.1 가

RELAP5/MOD3.2.1.2 RELAP5/MOD3.2.2 가 [2]

PSI [3] 가 RELAP5/MOD3.1

version RELAP5/MOD3.2.1 version

가

AECL Lookup Table[4] [5] 가 (annulus)

bundle

junction material courant

(half-time step control)

flow anomaly fix

(steam/water property failure) annular-mist flow (wall friction)

Penn. State

가 3 PARCS

MARS [6] RELAP5/MOD3.2.1 COBRA/TF

RELAP5 가

가 RELAP5/MOD3.2.2

MARS MARS

RELAP5/MOD3.2.2

MARS

RELAP5/MOD3.2.2

가 level tracking

## 2.

### 2.1

RELAP5

fine mesh rezoning, axial conduction

가

PSI

[3] RELAP5/MOD3

quench front

fix

interfacial heat transfer, interfacial drag, wall heat transfer

low flow CHF

MARS

FLECHT 31805

RELAP5/MOD3.2.2

MARS 1

1

quenching tail

가

PSI

MARS

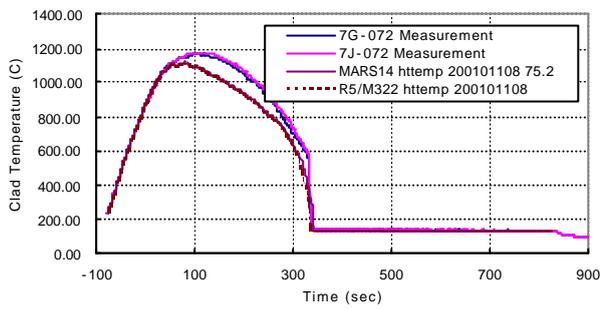
2

PSI

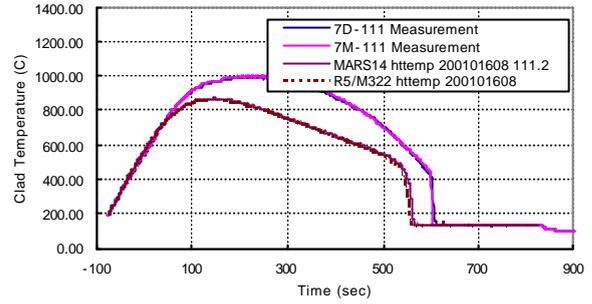
FLECHT

( RELAP5/MOD3.1

RELAP5/MOD3.1/K[7] )



1. (72" ) 가



2. (112" ) 가

## 2.2

[5] 가

173

, 23

,

153

bundle

3

4

가 . 4 “basic ”

(equilibrium quality)

. “Flux ”

가

. “geometry ”

가

. “Power ”

CPR (Critical Power Ratio)

. RELAP5/MOD3.2.2

가

chfcsl

가

. MARS

RELAP5 AECL Lookup Table

가

RELAP5/MOD3.2.2

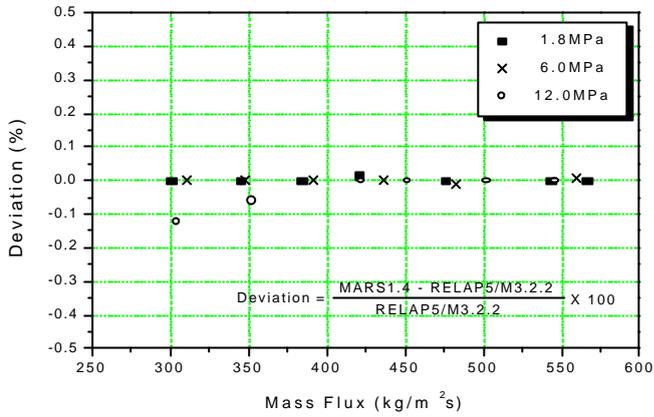
가

. 3

RELAP5/MOD3.2.2

가

MARS



3. MARS1.4 RELAP5/MOD3.2.2

2.3

RELAP5

MARS

, Material Courant

가

2

1/2

hardware/software

truncation

가

RELAP5/MOD3.2.2

courant limit

1.1

가

MARS

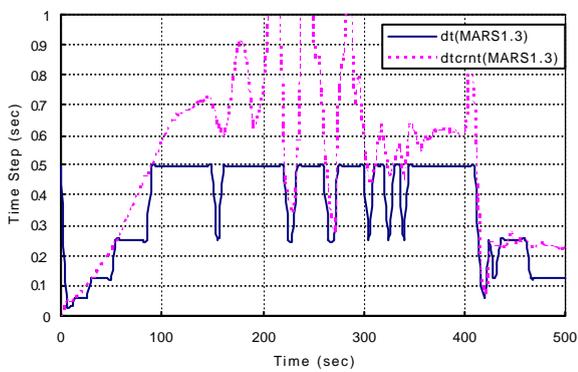
4

5

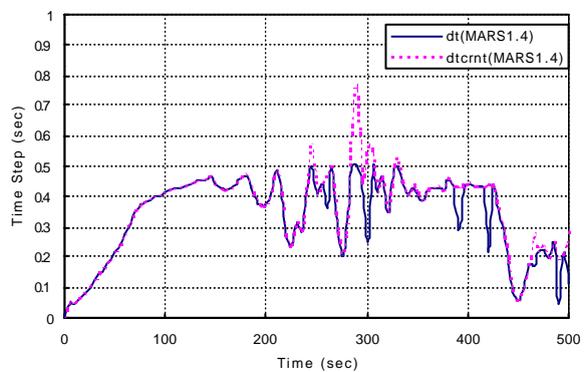
4

가

Courant



4. MARS



5. MARS

2.4

RELAP5/MOD3.2.2 Flow anomaly

RELAP5

4 가 1) (

) momentum flux 2) ( ) - (difference

momentum equation) ill-posed 3) Drift flux 4)

junction

RELAP5/MOD3.2.2 4

RELAP5 가

Taylor series truncation 가

RELAP5/MOD3.2.2

mixture

(steam/water property

error) RELAP5/MOD3.2.2

Annular mist penetration ECC bypass

RELAP5/MOD3.2.2 MARS

MARS

3.

MARS RELAP5/MOD3.2.2

RELAP5/MOD3.2.2 MARS

MARS 가 RELAP5/MOD3.2.2 1

MARS 1 가 RELAP5/MOD3.2.2

LOFT LBLOCA

Plant MARS

flow anomaly

1 MARS RELAP5/MOD3.2.2

	RELAP5/MOD3.2.2		MARS
		PSI	
	가		
		Courant	
Flow Anomaly			
Annular-mist		Wallis Friction	
		Penn. State	
Level Tracking Model		TRAC-BF1	
3		PARCS Code Link	

4.

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- [3] G.Th.Analytis, “Developmental Assessment of RELAP5/MOD3.1 with Separate Effect and Integral Effect Test Experiments: Model Changes and Options,” *Nuclear Engineering and Design*, 163, pp. 125-148 (1996)
- [4] D. C. Groeneveld, S. C. Cheng, and T. Doan, “1986 AECL-UO Critical Heat Flux Lookup Table,” *Heat Transfer Engineering*, 7, 1-2, pp. 46-62 (1986).
- [5] R. Pernica and J. Cizek, “General Correlation for Prediction of Critical Heat Flux Ratio,” *Proceedings of the 7th International Meeting on Nuclear Reactor Thermal-Hydraulics, NURETH-7, Saratoga Springs, NY, September 10 - 15*, NUREG/CP-0142, Vol. 4. (1995)
- [6] W.J.Lee, B.D.Chung, J.J.Jeong, K.S.Ha , “Improvement of Multi-Dimensional Realistic Thermal-Hydraulic System Analysis Code, MARS 1.3”, KAERI/TR-1141/98 (1998)
- [7] B.D. Chung, et. al. "Improvement to the RELAP5/MOD3 Reflood Model and Assessment", *J. of Korean Nuclear Society*, Vol.26, No.2, June (1994)