

KALIMER-600

Design Improvement of Thermal Protection of KALIMER-600 Reactor Vessel

150

가

KALIMER-600

KALIMER-600

가

Abstract

LMR reactor vessels could suffer a thermal damage due to the high temperature and significant thermal stress in the hot pool free surface regions of reactor vessel. The thermal protection mechanism of LMR reactor vessel should be designed for the structural integrity in high temperature condition. In this paper, the thermal protection mechanism of foreign LMR reactor vessels is investigated for the power upgraded KALIMER-600. The air cooling system is proposed for the decrease of vessel wall temperature, and the modified reactor baffle design with multiple thermal shield structures is proposed for the reduction of thermal damage for KALIMER reactor vessel. The modified reactor baffle design leads to reduce the thermal stress and the air cooling system leads to decrease the vessel wall temperature.

1.

500

가

가

KALIMER-150
RV
PVCS

가가
KALIMER-600

2.

3가

가 가 400
EFR(1470MWe) SPX(1300MWe)
1 [1,2].
(5%) weir

가 가 overflow 가 가
가 가
425) CFBR
[3].

MONJU

DFBR Phase I

2

DFBR Phase II

[Inagaki, 2000].

thermal shock

thermal liner(10mm)

II

50 mm

35mm

DFBR Phase

CFBR

가

30mm

가

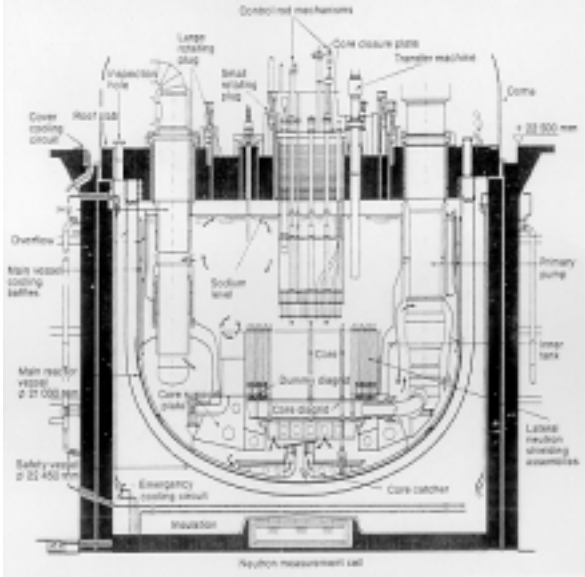
CFBR

3

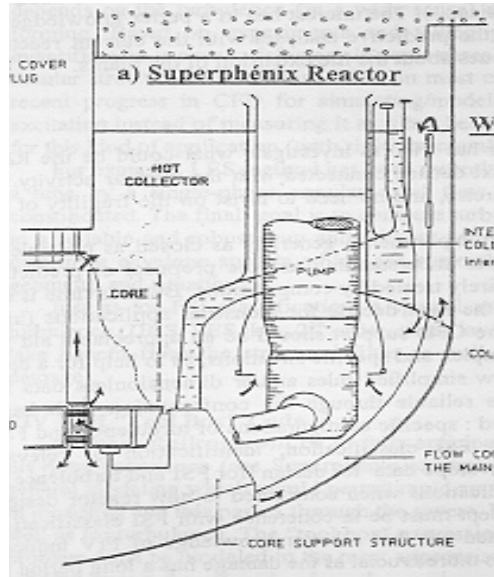
3

가

30mm



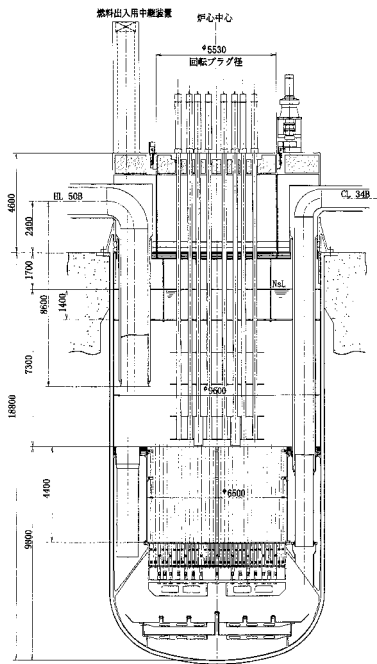
(a) Super Phenix (SPX)



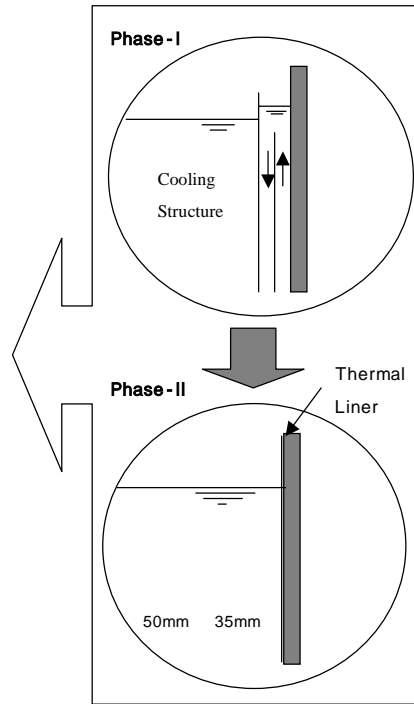
(b) Cooling Structure

1

SPX



2



(DFBR)

(Reactor Baffle)

가

S-PRISM(330MWe)

[4,5].

KALIMER-150(150MWe)

Reactor Baffle

PVCS 가

가

가

S-PRISM KALIMER-150 RV

RV

Large LMFBR(1000MWe)

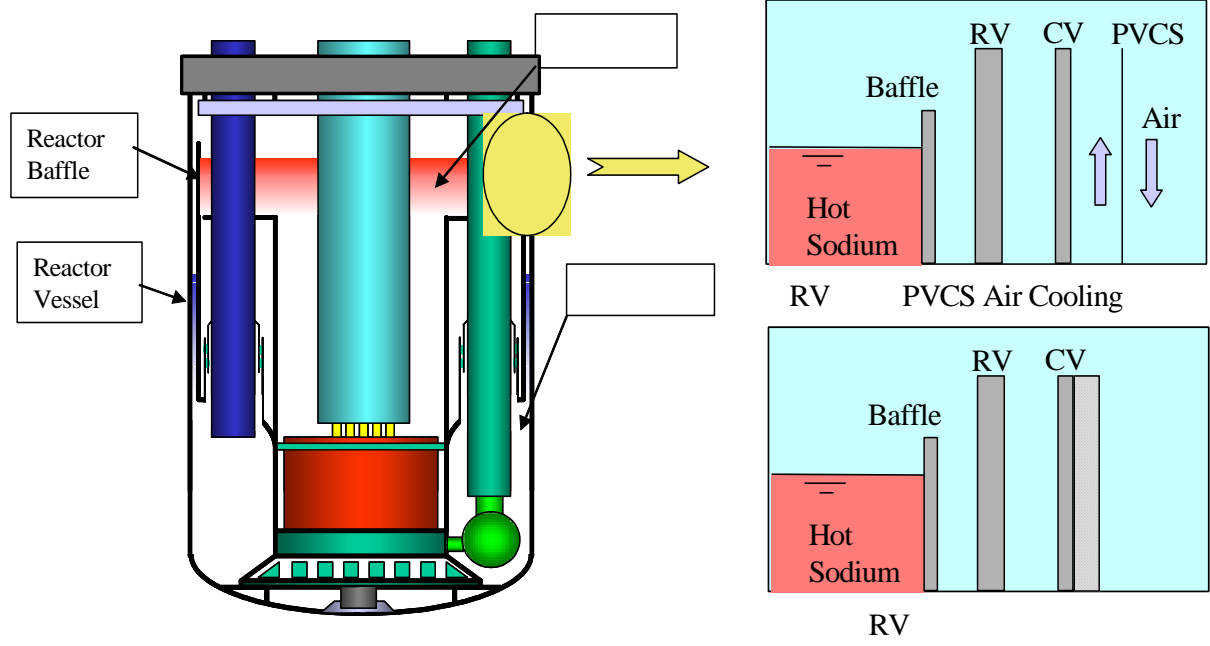
S-PRISM KALIMER-150 RV 가

가

4

RV

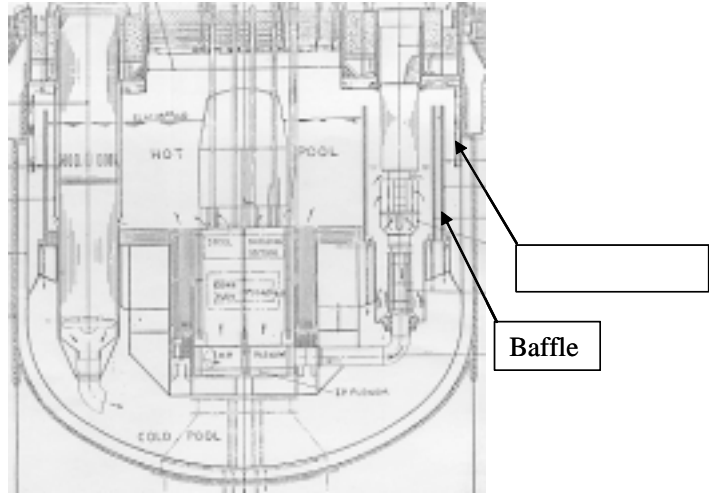
RV 가



3.

RV

(KALIMER-150/KALIMER-600)



4. RV (Large Pool LMFBR)

3. KALIMER-600

가

가

가 Thermal Baffle RV PVCS

가 5 가 Thermal Baffle RV Thermal Baffle 1, 3 (Thermal Protection Liner)

5 Thermal Baffle 가 2mm Thermal Baffle 10mm 200 가 510

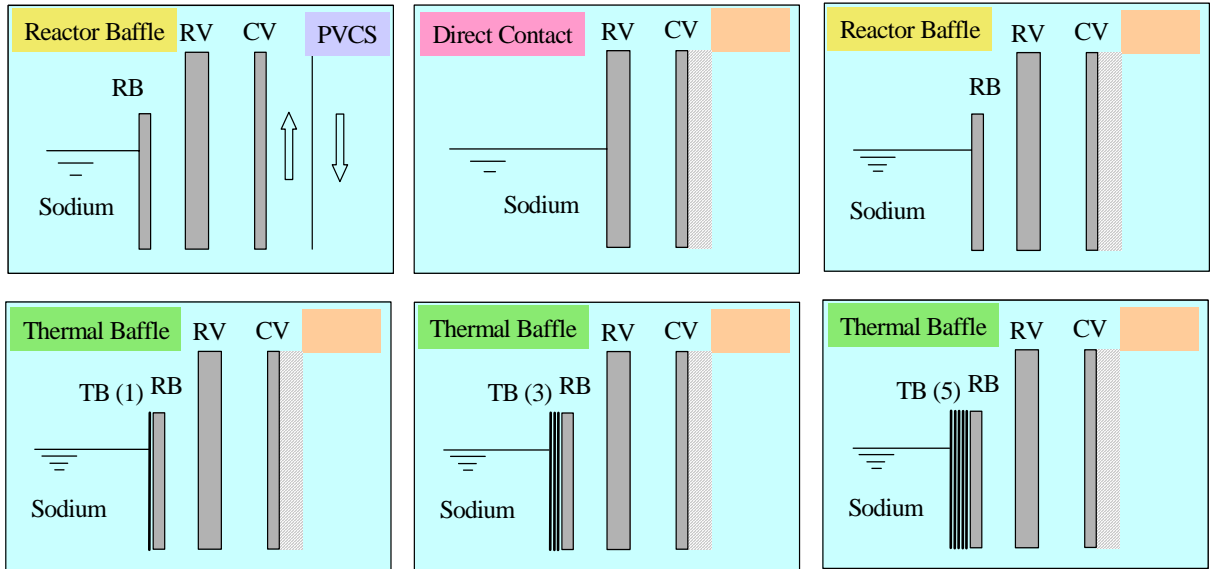
ANSYS 5.5 PLANE75

PVCS LINK31

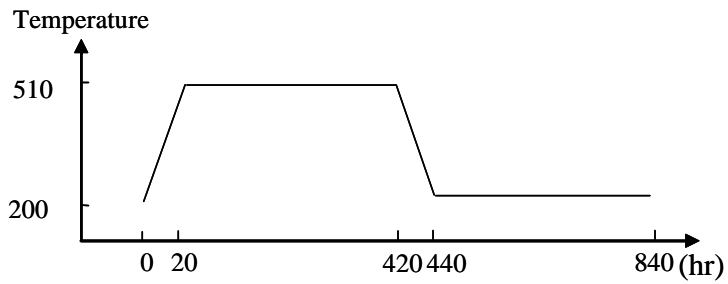
0.2, 0.7 0.8 150

가 KALIMER-600 11.31m 5cm

3000 316L SS 2.25Cr-1Mo

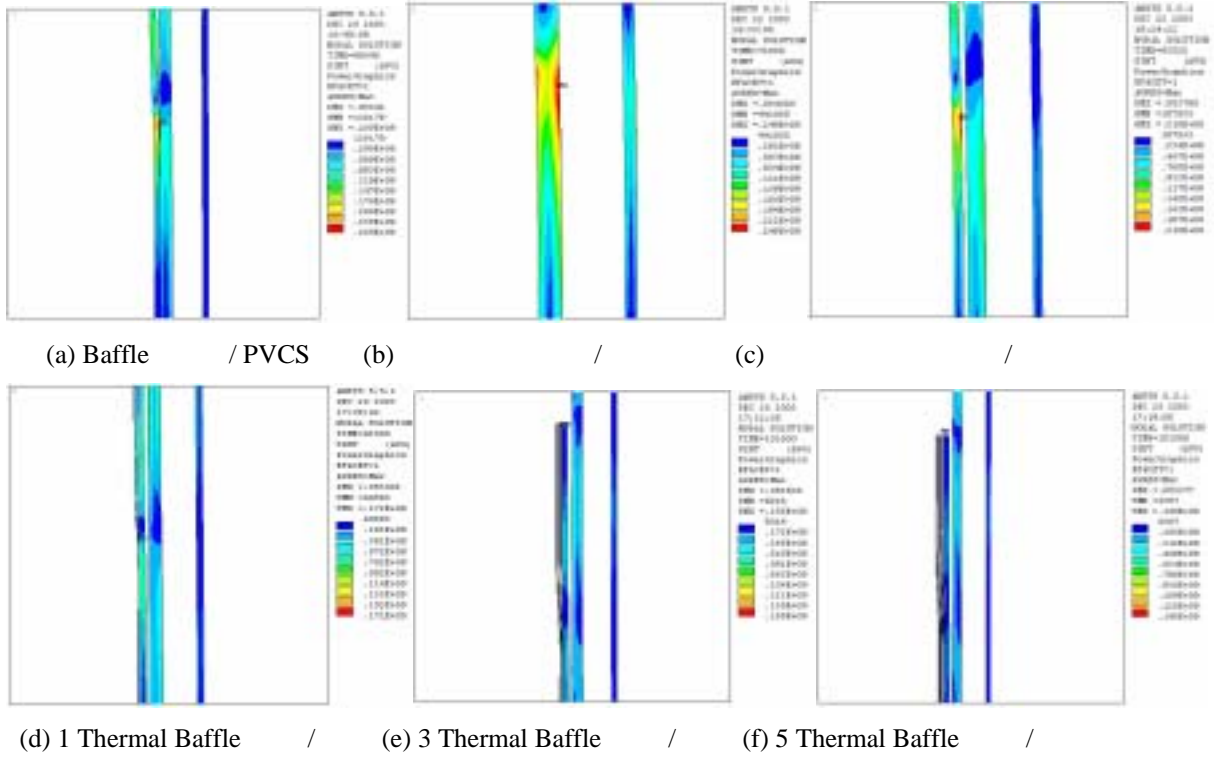


5. KALIMER-600

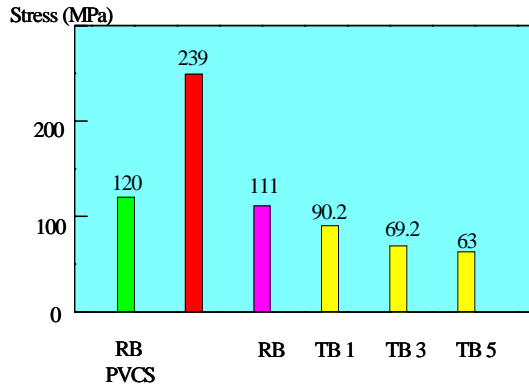
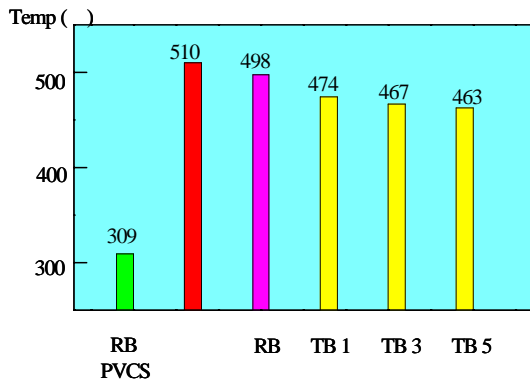


6. (Load step)

7 8 6가 . PVCS가
 CV 가 RV 가
 ASME-NH 가 가 가
 ASME-NH 427 가 .
 8 .
 . 9
 . PVCS RV 가
 가
 . 가
 가 510 가 239MPa 가 가
 가 가 가
 가 500 가 111MPa
 가 . Thermal Baffle 1 , 3 , 5 가



8. KALIMER-600



9. KALIMER-600

4.

500
가

KALIMER-600

가

KALIMER-

600

. KALIMER-600

가
KALIMER-600

가가

가

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- [2] L. Borsoi, "Flow-Induced Vibration of Nuclear Components : Future R&D Perspective Derived from French Experience," SMIRT 16, Div. J, pp.1-12, 1991.
- [3] T. Inagaki, et al., "Design Study of the Demonstration FBR in Japan," ICONE-8048, 2000.
- [4] , KALIMER , , KAERI/TR-2204/2002, 2002.
- [5] G.E. Boardman, et al., "A Description of the S-PRISM Plant," ICONE-8168, 2000