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RESPONSE TO "COMMENTS ON THE DYNAMICS OF FUEL VAPOR PRESSURE BUILDUP IN LIQUID-METAL FAST BREEDER REACTOR CORE DISRUPTIVE ACCIDENTS"

In response to the remarks of Fischer,[1] we point out that the parametric study in our paper[2] was conducted because of the uncertainties in the values of α', the coefficient of evaporation, and V/A, the ratio of the volume available for the vapors to spread and the surface area available for evaporation. The value of α' is not known and could be orders of magnitude less than unity, particularly for oxide and carbide fuels. Similarly, the ratio of V/A is uncertain, and it is difficult to ascertain the correct value of V/A applicable to the accident situations of core melting in liquid-metal fast breeder reactors. To check the way in which the results are affected if α' is less than unity by orders of magnitude and/or V/A approaches its theoretical limiting highest value, we conducted the parametric study by arbitrarily taking l_2 several times larger than l_1 [see Eq. (10) of Ref. 2]. On the other hand, it could also mean that l_2 is effectively equal to l_1 but α' is reduced by orders of magnitude. To some extent, this point has been discussed in the last paragraph of Ref. 2.

We agree with Fischer's remarks that as far as the evaluation of V/A is concerned, the surface area available for evaporation is larger than just the molten pin surface area; therefore, the effective length of the space to be filled would be smaller. Thus the reference case of Ref. 2 appears to be a reasonable upper limit. As mentioned above, however, our parameteric study was intended to examine the uncertainties in α' also; hence, to this extent, parametric study is useful in providing the range of results due to this uncertainty.

We welcome the useful remarks of Fischer and appreciate his interest in our paper.

Om Pal Singh and P. Bhaskar Rao

Indira Gandhi Centre for Atomic Research
Reactor Group, Kalpakkam 603 102
Tamil Nadu, India

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