CORRELATION BETWEEN FUEL PINS IRRADIATED IN FAST AND THERMAL FLUXES USING THE FRUMP FUEL PIN MODELLING PROGRAM

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SUMMARY
As yet there are no experimental facilities in which a fuel pin can be irradiated in a fast flux environment under well defined conditions of overpower or flow run down. Consequently most of the information which is being accumulated on the behaviour of fuel pins under severe conditions is obtained from either capsule or loop rigs in thermal reactors. It is the purpose of this paper to highlight the differences between the behaviour of fuel pins irradiated in a thermal flux and a fast flux. This is done by taking a typical set of conditions from an overpower experiment in a thermal flux and analysing the behaviour of the system using the fuel modelling program FRUMP. A second numerical experiment is then performed in which precisely the same conditions prevail, with the difference that a fast flux is assumed, the criterion for comparison being that the total power input to the system is the same in both cases.

From the many possible correlations which result from such an exercise we have chosen to concentrate on the fuel temperature and to use this to highlight various important features of the two irradiations. It is clearly demonstrated that the flux depression can cause differences in the pin behaviour, even to altering the order of events in a transient. For example, fuel melting will occur at different times and at different positions in the fuel in the two cases. It is concluded that the techniques of fuel modelling, as typified in the program FRUMP can provide a very useful tool indeed for the analysis of such experiments and for guiding the establishment of the appropriate correlations for the extrapolation to the fast flux case.