Letters to the Editor

Comments on "On the Excitation of Neutron Flux Waves in Reactor Core Transients"

In a recent paper,[1] we presented a perturbation description of neutron flux waves observed in numerical calculations of the pressurized water reactor rod ejection accident (REA). In this analysis an infinite but denumerable basis set of stationary flux states was introduced to describe the observed flux waves. In a subsequent paper, Difilippo and Perez showed that for the case of a homogeneous one-group slab reactor these flux states are strongly attenuated, and concluded that the flux spectra are continuous and a discrete set of states does not exist.[2] The purpose of this letter is to point out that the simplified model used by Difilippo and Perez is not applicable to the calculation of the attenuation of the flux states observed in the numerical REA calculations.

The REA transient calculations were performed in three dimensions using a two-group flux representation for a core that contained strong spatial heterogeneities. In the calculation of the flux attenuation length employed in Ref. 2, the local reactivity is determined using the criticality condition for a one-group spatially homogeneous slab reactor. These simplifications result in a reactor slab thickness that is a factor of $\sim$4 smaller than the actual core diameter, a first harmonic frequency $\sim$200 times larger than observed, and a large underprediction of the observed flux wave attenuation length. The simple slab model employed in Ref. 2 does not provide a valid determination of the quantitative behavior of the observed flux waves or of the character of their excitation spectrum.

J. F. Carew
P. Neogy

Brookhaven National Laboratory
Upton, Long Island, New York 11973

May 15, 1987

REFERENCES

1. J. F. CAREW and P. NEOGY, *Nucl. Sci. Eng.*, **91**, 117 (1985).

2. F. C. DIFILIPPO and R. B. PEREZ, *Nucl. Sci. Eng.*, **94**, 66 (1986).

Response to "Comments on 'On the Excitation of Neutron Flux Waves in Reactor Core Transients'"

In response to Ref. 1, we want to emphasize that the three-dimensional, two-group, time-dependent calculations of Ref. 2 refer to the calculation of a "numerical experiment" and not to the interpretation of the data. Carew and Neogy indeed used a simplified, one-group, one-dimensional model to interpret the computer output.

We have used[3] the same simplified model to emphasize that the frequency is a continuous variable. Our results were expressed in terms of universal functions without reference to any particular system; this was possible due to the use of the critical condition that establishes a relationship between migration length, size, local reactivity, and the dispersion law. The model is open to allowances due to moderation effects via the use of a migration length.

Equations (8) and (9) of Ref. 2, as presented, are completely arbitrary; and Eq. (9) is incompatible with Eq. (A.14) of the same reference. We invite the authors to calculate the Green's function in frequency domain, to convolute it with the perturbation, and to apply the inverse Fourier transform in order to investigate under what condition the integral in frequency domain can be written in terms of a sum over discrete frequencies.

Felix C. Difilippo
Raphael B. Perez

Oak Ridge National Laboratory
P.O. Box X, Bldg. 6025
Oak Ridge, Tennessee 37831

May 23, 1987

REFERENCES

1. J. F. CAREW and P. NEOGY, *Nucl. Sci. Eng.*, **97**, 257 (1987).

2. J. F. CAREW and P. NEOGY, *Nucl. Sci. Eng.*, **91**, 117 (1985).

3. F. C. DIFILIPPO and R. B. PEREZ, *Nucl. Sci. Eng.*, **94**, 66 (1986).