Letters to the Editor

Comments on An Improved Collision Probability Method for Thermal-Neutron-Flux Calculation in a Cylindrical Reactor Cell

In a recent paper Boševski [1] expands the flux in each homogeneous annulus in even powers of "r". This is justified for the innermost region, but it seems to me that these functions would not form a complete set for the remaining regions.

Consider for example the function $ln\, r$ that occurs in the flux in a nonabsorbing region extending say from "r_1" to "r_2". Expanding $ln\, r$ about $\bar{r} \equiv (r_1 + r_2)/2$, we obtain

$$ln\, r = ln\, \bar{r} - 1 + r/\bar{r} + \ldots \quad .$$

I have not attempted to assess the error introduced into the calculation by the neglect of the odd powers of "r".

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[1]T. BOŠEVSKI, *Nucl. Sci. Eng.*, **42**, 23 (1970).

Reply to the Comments of J. D. Stewart on the Calculation of Thermal-Neutron Flux

The function $ln\, r$ describes the neutron flux distribution in a diffusion approximation around the cylindrical absorber situated in an infinite weakly absorbing medium. However, a transport solution for a reactor cell must not necessarily have the same form. Therefore, the use of expansion in even powers of the radius is not excluded, *a priori*.

The final verification of that particular choice is achieved by comparison with the results of the more sophisticated DIT and CP methods. Further details are explained at the beginning of the fourth paragraph in the published paper.

Concerning the comment about the $ln\, r$ function, it is easy to show that the following Taylor expansion is valid:

$$ln\, r = \frac{1}{2}\, ln\, r^2 = \frac{1}{2}\left| ln\, \overline{r^2} - 1 + \frac{r^2}{\overline{r^2}} + \ldots \right| \quad ,$$

where

$$\overline{r^2} = \frac{r_1^2 + r_2^2}{2} \quad .$$

It can be seen that the odd terms are not neglected but only the transformation of variable is performed.

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