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Title: A new version of the reflected core inhour equation and its solution

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Abstract:

The study of the neutron evolution in nuclear systems is a challenging mathematical and physical problem since it constitutes a fundamental topic in the design of critical and subcritical reactors. The object of this paper is to derive a mathematical framework to characterize a new version of the two point inhour equation to determine its roots for reflected reactors. To attain such scope an analytical approach is always used for analyzing the diffusion theory model with one energy group of neutron and G delayed family of precursors. The modified two-point inhour equation is deduced and an analysis of its roots is performed taking into account the ability to modify source reactivity variation. In addition, the work proposed a number of delayed neutron models using more than the tradiational six groups, where the effect of the reflector is considered mathematically equivalent to an additional delayed pseudo-neutron group. For the case of source reactivity variation an asymptotic reactor period is deduced as a solution of this modified inhour equation. The exact solution of the two-point reactor kinetic equations is obtained, in which each transient in the neutron population is a linear combination of exponential functgions at different time constants, their respective contributions depends on their previous history. Finally, the numerical results obtained with these algorithms are applied and verified for four cases of reflected reactors.