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Homogenization of a spectral problem in neutronic multigroup diffusion. (English)

Zbl 1126.82346

Comput. Methods Appl. Mech. Eng. 187, No. 1-2, 91-117 (2000).

Summary: This paper is concerned with the homogenization of an eigenvalue problem in a periodic heterogeneous domain for the multigroup neutron diffusion system. Such a model is used for studying the criticality of nuclear reactor cores. We prove that the first eigenvector of the multigroup system in the periodicity cell controls the oscillatory behaviour of the solutions, whereas the global trend is asymptotically given by a homogenized diffusion eigenvalue problem. The neutron flux, corresponding to the first eigenvector of the multigroup system, tends to the product of the first periodic and homogenized eigenvectors. This result justifies and improves the engineering procedure used in practice for nuclear reactor core computation.

Reviewer: [Reviewer \(Berlin\)](#)

MSC:

[82D75](#) Nuclear reactor theory; neutron transport

[35B27](#) Homogenization in context of PDEs; PDEs in media with periodic structure

[35Q99](#) Partial differential equations of mathematical physics and other areas of application

Cited in **18** Documents

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