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Aushang

Bearbeiter/in: Frau I. Schwartz

Datum: Dienstag, 21. Juli 2020

Einladung zum Seminar über „Nukleare Energieerzeugung“

Zeit: Montag, 27. Juli 2020, 11:00 Uhr

Ort: **Das Seminar findet online statt.**

Referent: Frau Yu Zheng, Institute of Plasma Physics, Chinese Academy of Sciences, Hefei, Anhui, China

Titel: A novel on-the-fly global variance reduction technique for general-purpose Monte Carlo shielding calculations

Abstract:

Using Monte Carlo (MC) transport codes for shielding calculations of nuclear devices, e.g. fusion and neutron source facilities, is very challenging due to the geometry complexity and insufficient statistics behind the heavy shielding structures. The use of variance reduction methods, e.g. the weight window mesh (WWM) method, is often indispensable. A new “on-the-fly” (OTF) global variance reduction (GVR) method has been developed to accelerate the MC shielding calculations. It generates and updates the global WWM automatically in the MC code. As a result, the weight window map together with the global flux map can be obtained by one single MC run. One common issue of GVR methods is the so-called “long particle history” problem, in which the simulation is frozen due to the over-splitting of particle tracks. In this work, a novel approach has been introduced to address this issue. With the OTF variance reduction method, high quality WWM can be quickly generated through an automatic iteration process. Test verifications of the OTF method have been performed on several models, including a bulk-shielding model (8 m wall thickness), complex ITER engineering model (>17 m device radius), and the IFMIF-DONES engineering model (4 m-thick heavy concrete). Its efficiency has been compared to analogue MC simulations and the most common-used FW-CADIS method. The OTF method has demonstrated superior speed-up effects over analogue and FW-CADIS methods, and its suitability to challenging shielding applications.



gez. R. Stieglitz