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Shielding of radiation from atmospheric dispersion resulting from a radiological accident

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This work describes the determination of the shielding against ionizing radiation from atmospheric dispersion arising from a radiological accident in a small nuclear reactor (SMR). Among the radionuclides from the inventory of this reactor, the contribution of Cs-137 was considered for simulation in HotSpot (analytical modeling) and ANSYS (numerical modeling), of the concentration and total effective doses (TEDE) received, both depending on the distance of the event. The analytical solution, based on the hypotheses of the Gaussian approach, aims to validate the numerical solution brought by the CFD techniques, in a simplified computational scenario, taking into account the set of partial differential equations that govern the physical phenomenon of the transport of this material radioactive. Additionally, for the analysis of shielding, Taylor's formulations were used to perform simple shielding calculations, considering only shelters, based on ordinary concrete, possibly existing in the contaminated area, and Broder, in multilaminated cases, with adding a layer of lead to the front of the wall. The relevance of this investigation shows the importance of planning responses in an emergency situation, considering the data assumed in the simulations.

Promotional text

The present work can contribute to multilateral scientific cooperation, since the computational tools of this study can still be used in civil applications, such as the release of radionuclides from medical facilities, for example, and which use radioactive sources.

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