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杭州湾区域氚的迁移扩散行为模拟

摘要

杭州湾是世界知名的潮汐河口，一直是研究热点区域。本研究以秦山核电站为研究对象，采用二维数值模拟方法，研究放射性核素在水环境中的迁移行为。基于 MIKE 模型，构建了杭州湾二维水动力模型，用以模拟受纳水体的流场及在不同时间假设事故情景下氚的迁移过程。本文评估了在不同季节潮汐作用下，杭州湾中放射性核素的分布特征。研究结果表明，所模拟的流场在很大程度上能够反映杭州湾区域的实际情况对于不同排放速率的事故情景，氚的浓度场呈现出相似的分布模式，但峰值浓度存在显著差异。同时，潮汐作用将放射性核素带往外海，能够降低厂址附近的氚浓度。

关键词

氚，核素迁移，释放速率，数值模拟

Abstract

Hangzhou Bay is a world-renowned tidal estuary and has long been a hot topic of research. This study focuses on the Qinshan Nuclear Power Plant and adopts a 2D numerical simulation approach to investigate the transport behavior of radionuclides in the aquatic environment. Based on the MIKE model, a two-dimensional hydrodynamic model of Hangzhou Bay was constructed to simulate the flow field of the receiving water body and the transport of tritium under hypothetical accident scenarios at different times. This paper assesses the distribution characteristics of radionuclides in Hangzhou Bay under the influence of tidal forces in different seasons. The results show that the simulated flow field largely reflects the actual conditions in the Hangzhou Bay area. For accident scenarios with different release rates, the concentration fields of tritium exhibit similar distribution patterns, but there are significant differences in peak concentrations. At the same time, tidal forces carry radionuclides to the open sea, which can reduce the tritium concentration near the plant site.

Keywords

Tritium, Radionuclide transport, Release rate, Numerical simulation

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