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技术及应用

高气压组织等效电离室用于混合辐射场测量的实验研究

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摘要 介绍了基于复合理论的组织等效电离室的设计原理，利用该原理设计的区域中子、γ剂量当量仪可使用1个探头间接测量周围剂量当量、吸收剂量和品质因子。利用加速器和标准辐射场对该装置进行测试，测试结果表明，该装置对于中子和γ辐射场，尤其是对于高能γ、热能至几十MeV的中子具有较好的能量响应和较高的灵敏度，在剂量率高于几十μSv/h时，测量不确定度可控制在±50%以内。该系统可为存在中子、γ辐射场的场所提供必要的测量手段和监控技术。

关键词 混合辐射场 周围剂量当量 品质因子 离子收集效率

分类号

Experimental Research of High-Pressure Tissue Equivalent Ionization Chamber Used for Detecting in Mixed Radiation Field

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Abstract The design principle of tissue equivalent ionization chamber based on the theory of recombination was described, and the area neutron and gamma dose equivalent instrument was designed. This detection system can indirectly acquire the information of the ambient dose equivalen, the absorbed dose and the quality factor of the mixed radiation field using only one probe. Moreover, the detection system was tested by the accelerator and the standard radiation field. The results indicate that the system has good energy response and sensitivity to the neutron and gamma radiation, especially to the high energy gamma radiation and the neutrons with energy ranging from thermal to dozens of MeV. The uncertainty can be controlled within ±50%, while the dose rate of the radiation is above dozens of μSv/h, so this detection system can serve as the necessary measurement instruments and monitoring technology for the places having the mixed radiation field of neutron and gamma ray.

Key words mixed radiation field ambient dose equivalent quality factor ion collection efficiency

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