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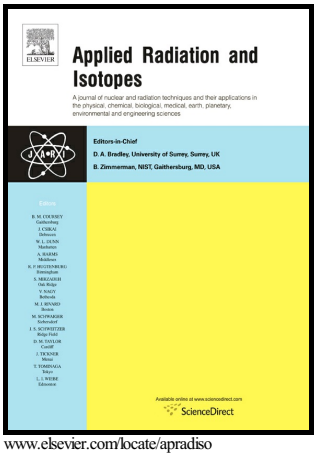

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RESEARCH ARTICLE

Nondestructive study of wood using the Compton scattering technique

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Abstract

A simple nondestructive method is presented in this study to characterize woods having different densities, thus estimating the size and depth of inhomogeneities in given wood samples using the Compton scattering technique (CST). This technique uses a collimated beam of 662-keV energy from ^{137}Cs radioactive source, and the scattered flux is detected by an NaI(Tl) detector. To characterize different wood samples on the basis of their densities, both scattering and transmission experiments were performed. The presence of inhomogeneities such as knots in wood was simulated by drilling cylindrical voids of diameter 9 mm in the samples and then filling them with a high-density material (aluminum). Furthermore, different sizes of inhomogeneities (Al cylinders) were filled in the wood samples to estimate the depth and size of the inhomogeneity using the CST. A higher linear correlation ($R^2 \sim 0.96$) was found between the scattered intensity and the density of different woods using the CST than that using the transmission ($R^2 \sim 0.83$) method by measuring the density range. An increase of 24.6% in the average scattered intensity was observed at the location where the knot was present, and it was found that an inhomogeneity of the order of

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