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Precision of Porosity Calculation and Material Identification Using Neutron Radiography

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Abstract content
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The capabilities of neutron radiography to calculate physical properties of porous media such as porosity and to identify the constituencies of the sample in a non-destructive manner, are of great important in the fields of nuclear waste encapsulation and –shielding, civil engineering and geological studies. Material thickness and radiation scatter hamper the accuracy and precision of the porosity calculation and material identification using neutron radiography. Correction softwares are current used to correct for the scattering errors. At the South African Neutron Radiography (SANRAD) facility, calculation done when the sample is too close (≈ 0 cm) to the detector yield accurate and precise results without applying any correction tool. The improved results are made possible with the use of the so called “pseudo mass attenuation” derived from the experimental data results. This talk demonstrates the accuracy and precision of neutron radiography porosity data compare with the conventional gravimetric method. It also demonstrates how the pseudo mass attenuations follow the linearity of Lambert equation of neutron attenuation with respect to the thickness of the sample.

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Primary author: Mr NSHIMIRIMANA, Robert (NECSA)

Co-author: Mr DE BEER, Frikkie (NECSA)

Presenter: Mr NSHIMIRIMANA, Robert (NECSA)

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