Contribution ID: **338** Type: **Oral Presentation**

A New Simplified Spatial Resolution Criterion to Obtain the MTF Curve From Edge Analysis in the Real Space

Thursday, 6 July 2017 15:20 (20 minutes)

Digital neutron imaging (radiography and tomography) is a powerful non-destructive analytical tool and has demonstrated its importance in industrial and research applications world-wide. The standardization process, to certify digital thermal neutron imaging as a standard practice in industry, entails standardized performance characterization methods. Spatial resolution is one of the key performance indicators of the digital neutron imaging instrument. Knowing the spatial resolution of an imaging system is essential for the accuracy of dimensional measurements.

There are standards for digital imaging like the ISO 12233: 2014 on spatial resolution and spatial frequency responses, which is also applicable to digital neutron radiography provided adjustment of some limiting criteria is performed. This standard applies edge analysis through the modulation transfer function (MTF) method. The modulation transfer function analysis is conducted in the Fourier domain, which some operators find cumbersome and in addition it does not provide information about the resolution sharpness of the system. The current work provides a simpler and unambiguous edge analysis method conducted in the same domain as the image information. It establishes a criterion for edge analysis in the spatial domain and compares the results to MTF according to ISO 12233: 2014. The use of Full Width at Half Maximum (FWHM) on the line spread function (LSF) is discouraged and the limitation of the 10% - 90% on the edge spread function (ESF) to only estimate resolution limit at 10% MTF is overcome through the criterion established in this work. This criterion produces a full MTF curve from 0% to 100% MTF values from the edge analysis in the same domain as the image.

Apply to be
 considered for a student
   award (Yes / No)?

Yes

Level for award
 (Hons, MSc,
   PhD, N/A)?

PhD

Main supervisor (name and email)
and his / her institution

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Would you like to <br> submit a short paper <br> for the Conference
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No

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Session Classification: Photonics

Track Classification: Track C - Photonics