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Super Resolution and Criteria for best dynamic imaging capability with a neutron CCD camera used for dynamic process image capture and analysis

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Neutron imaging is a powerful method for non-destructive investigations where high penetration through metals and in particular high contrast for hydrogenous materials maybe exploited. Due to the complexity of digital neutron static or video image formation, image capture conditions and parameters must be accurately selected. In this work, experimental acquisition conditions in terms of integration time (τ) and signal gain (G) for optimum neutron video capture of water flow processes inside metallic pipe system were studied and established according to the neutron source properties and CCD camera electronic characteristics. Neutron imaging experiments were performed at the neutron radiography facility of the Algerian Es-Salam research reactor. Compromises between integration time, signal gain in one side and dynamic range and neutron source intensity in another side were established allowing optimum video sequence capture conditions. A post acquisition super resolution processing procedures were also applied to improve the quality of the video sequences obtained.

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