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Modelling of Radiation Resiliant Ultrasonic Sensors

Part of the ReDRESS Innovate UK project.

There is a need to test difficult to access, thick section steel components for weld defects and in-service corrosion that may lead to pressure vessel/component failure in the nuclear power generation industry that requires the application of high sensitivity ultrasonic testing (UT) techniques.

This project conducts research into the construction and testing of novel, radiation resilient, ultrasonic transducers manufactured from exotic materials and a variety of probe assembly techniques. The goal is to provide the nuclear industry with a reliable UT solution for prolonged in-service inspection and permanent monitoring. Two scenarios are envisaged: (a) elevated temperature, high radiation inspection close to the nuclear reactor (b) low radiation - inspection of nuclear waste containers stored at bespoke sites over very long periods. The objective is to develop a series of prototype ultrasonic probes designed to suit the specific in-service inspection needs.

Geant4 is used to support the development of the radiation resilient ultrasonic sensors through the examination of the effects of design on the radiation environment the sensitive components are subject to.

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