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**High-resolution ultrasonic sensor for channel gap thickness
measurement**

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ABSTRACT

Although each HPRR has a unique core design, the future LEU fuel plates will have to withstand similar and aggressive irradiation conditions and may thus undergo swelling at high burn-up. Such swelling induces plate structure microscopic modifications and impacts the initial inter-plate distance. This paper shows the development of a non-destructive high-frequency ultrasonic device allowing a high-resolution inter-plate distance measurement. It relies upon two ultrasonic transducers connected to acquisition and signal processing instruments. The distance measurement is performed through time of flight and velocity estimations of ultrasonic waves, propagating from sensors back and forth to the plates. Experiments were realized on the irradiated element of the Institute Laue Langevin High flux Reactor (the RHF) where device vertical position and temperature measurements were evaluated, leading to a 20 μm precision on the channel gap thickness.