

## **A Machine Learning Approach to Ultrasonic Testing Signal Degradation**

Ultrasonic testing (UT) is a form of non-destructive testing used within many disciplines of research and product inspection. This includes the fabrication of research and test reactor fuels. These scans utilize high frequency ultrasonic waves to take measurements to detect cladding thickness and bonding. Generally, the higher the frequency, the greater the precision and resolution, often at the cost of increased noise and artifact detection. However, since the material being scanned must be submerged under water, high level frequencies get dispersed upon contact with the water, thus degrading the signal. Unique challenges are posed by different fuel types, inspection of a monolithic fuel is different than a dispersion fuel. A solution has been researched to solve signal issues found in UT scans of nuclear research reactor fuel plates. The goal of this project is to look at scans where the signal was missing or degraded and reconstruct it based on neighboring successful scans utilizing various machine learning (ML) models. Longer term, the work is anticipated to reduce nuisance detections (i.e. sharp edges, impurities, or noise induced) while maintaining sensitivity to cladding thickness and bonding. This project is still under development, but upon completion will be helpful for long-term data preprocessing and analysis, along with aiding in various non-destructive testing analyses.