Wireless Reactor Power Distribution Measurement System Utilizing an In-Core Radiation and Temperature Tolerant Wireless Transmitter

Overview
- Wireless transmitter operating inside a fuel top nozzle, capable of continuously transmitting neutron flux data during plant operation. Device itself would be powered by harvesting radiation from the core.
- Serves as an enabling technology for other applications such as in-rod sensor and other in-containment applications.

Benefits
- Increase in reactor operating margin due to measurement density increase: 100% of fuel assemblies are instrumented vs. 33%.

Test highlights (Tested at the Penn State Breazeale Reactor)
- Amplitude Modulated Wireless transmitter capable of transmitting a signal proportional to a Rhodium Self-Powered Neutron Detector.
- AM Wireless transmitter functioned as expected when exposed to a neutron fluence of $1 \times 10^{19}$ n/cm².

Rx control through SPND
Black: Analog compensation
Red: Controller Setpoint
Blue: Uncompensated detector signal

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