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Fast Neutron Spectroscopy with Tensioned Metastable Fluid Detectors

Tension metastable fluid detectors enable high-efficiency, rapid-mode fast neutron spectroscopy by accurately deriving time delays between cavitation detection events to determine the spectrum of any arbitrary neutron source.

Neutron detection spectroscopy has significant importance in a wide range of fields ranging from physics to nuclear power to combatting nuclear terrorism. Unfortunately, many modern detectors have detection shortcomings. Tension metastable fluid detectors (TMFDs) offer a solution to such shortcomings by simplifying the determination of cavitation detection events (CDEs). CDEs occur from neutron interactions with several atom species. Therefore, accurately predicting these responses becomes extremely important in making a more effective neutron detector.

Researchers at Purdue University have developed a theoretical experimentation modeling architecture for enabling TMFDs to be used for high-efficiency, rapid mode fast neutron spectroscopy. Experimentation derived time delays between CDEs were obtained at various tension states and the results were coupled with algorithms and response curves to derive the unfolded neutron spectrum of any arbitrary neutron source. Overall, this produces a more accurate and effective neutron detection spectroscopy.

Advantages:

-Derives CDE time delays

-Accurate

Potential Applications

-Tension metastable fluid detector

-Neutron detection spectroscopy

TRL: 5

Intellectual Property:

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Energy & Power Systems/Power Generation

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