

NUCLEAR ENERGY UNIVERSITY PROGRAMS

Irradiation Creep in Graphite

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Abstract

An understanding of the underlying mechanisms of irradiation creep in graphite material is required to correctly interpret experimental data, explain micromechanical modeling results, and predict whole-core behavior. This project will focus on experimental microscopic data to demonstrate the mechanism of irradiation creep. High-resolution transmission electron microscopy should be able to image both the dislocations in graphite and the irradiation-induced interstitial clusters that pin those dislocations. The team will first prepare and characterize nanoscale samples of virgin nuclear graphite in a transmission electron microscope. Additional samples will be irradiated to varying degrees at the Advanced Test Reactor (ATR) facility and similarly characterized. Researchers will record microstructures and crystal defects and suggest a mechanism for irradiation creep based on the results. In addition, the purchase of a tensile holder for a transmission electron microscope will allow, for the first time, *in situ* observation of creep behavior on the microstructure and crystallographic defects.