CONTRIBUTION TO IRRADIATION CREEP ARISING FROM GAS-DRIVEN BUBBLE GROWTH - C. H. Woo (The Hong Kong Polytechnic University, Kowloon, Hong Kong) and F. A. Garner (Pacific Northwest National Laboratory)*

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EXTENDED ABSTRACT

In a previous paper the relationship was defined between void swelling and irradiation creep arising from the interaction of the SIPA and SIG creep-driven deformation and swelling-driven deformation was highly interactive in nature, and that the two contributions could not be independently calculated and then considered as directly additive. This model could be used to explain the recent experimental observation that the creep-swelling coupling coefficient was not a constant as previously assumed, but declined continuously as the swelling rate increased. Such a model thereby explained the "creep-disappearance" and "creep-damping" anomalies observed in conditions where significant void swelling occurred before substantial creep deformation developed.

At lower irradiation temperatures and high helium/hydrogen generation rates, such as found in light water cooled reactors and some fusion concepts, gas-filled cavities that have not yet exceeded the critical radius for bubble-void conversion should also exert an influence on irradiation creep. In this paper the original concept is adapted to include such conditions, and its predictions then compared with available data. It is shown that a measurable increase in the creep rate is expected compared to the rate found in low gas-generating environments. The creep rate is directly related to the gas generation rate and thereby to the neutron flux and spectrum.

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