Modeling Thermal-Mechanical Behavior of SiC-SiC Cladding in BWR Fuel Assemblies using BISON

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The low temperature radiation-induced swelling behavior of SiC is dependent on the fast neutron flux and irradiation temperature. In the presence of neutron flux and temperature gradients, this can produce bowing of the SiC components. The flux and thermal hydraulic profiles are provided by simulations performed in SERPENT and CTF codes, which supplies the necessary information to calculate the expected displacement of the SiC-SiC components. Methods are being developed to asess the extent of the displacement, and the stress profiles, with the constraint provided by spacer grids. Modifications to the available boundary conditions are in progress to allow for the numerical convergence of these simulations. It is expected that this modeling capability would provide information on maximum flux and temperature gradients, and the effect of mechanical constraint, for future design criterion in order to avoid fuel assembly bow or cladding micro-cracking leading to through wall penetrations.