NE250 Summary 6

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Neutronic performance of uranium nitride composite fuels in a PWR

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Current nuclear reactors face stiff competition in energy markets from far less capital intensive power plants, such as coal or natural gas. One way to maximize the return on investment for current nuclear plants is to facilitate a power uprate for the reactor, or reduce refueling outages. The article by Brown *et al.* explores how using uranium nitride (UN) fuel could maximize the output of PWRs as well as UN's compatability with contemporary reactor designs. In their analysis, the authors performed several simulations, first using TRITON and Serpent to generate applicable constants, and then using PARCS to use those parameters to model reactor cycles using UN in comparison to UO_2. Notably, their study showed that the UN fuel has significantly longer burn-up times than UO_2.

I think there were a couple of places the paper could have improved upon its descriptions. First, I was interested to note that the simulation did not include control rods, rather considering only integral fuel burnable absorbers (IFBAs). This strikes me as a curious choice since using control rods is standard practice in PWRs, and the article seems geared towards developing UN fuel as a replacement for UO_2 in current reactors. Secondly I would have like to see a comparison of how the core cycle extension production values compare with projections of processing costs for UN fuel.