



Fast Reactor Materials Issues & Their Implications for Design

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Extension of LWR Conditions to FR Conditions

- **Key Differences**
 - **Flux Distribution**
 - » (Energy)
 - **Total Dose**
 - » LWR/Thermal-~ 50 dpa max, FR > 100 dpa
 - **Temperature**
 - » 300°C (>300 for SCW) LWR/Thermal, FR > 500°C
 - **Fuel Type**
 - » UO₂ (MOX), UC/UCO LWR/Thermal, UC, UN, (Cermet, Cer-Cer, etc) FR
 - » Exposure (Burnup)
 - **Cladding Type**
 - » Zr Alloy LWR, SS, Fe-Based, Ceramic (SiC/SiC), etc. FR
 - » Dose
 - **Operating Environment**
 - » LWR/Thermal-Water, He, SCW, FR SC-CO₂, He,



Design Implications

- **Flux Distribution**
 - Radiation Damage
 - » Temperature, Energy Distribution
- **Total Dose**
 - Radiation Effects
 - » Swelling, He Embrittlement, Creep
- **Temperature**
 - Creep, Creep-Fatigue, Microstructural Stability
- **Fuel Type**
 - Fast Reactor “legacy” Data
 - Swelling, FGR
- **Cladding Type**
 - Fluence
- **Operating Environment**
 - Corrosion
 - Stability (Microstructural)