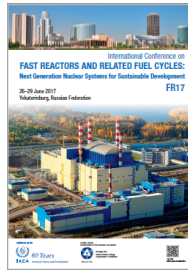


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Neutronic Self-sustainability of a Breed-and-Burn Fast Reactor Using Super-Simple Fuel Recycling

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The breed-and-burn fast reactor (B&BR) is a unique concept of fast reactor, which can breed the fissile fuels and use the bred fuels in situ. Thanks to this characteristic, the fuel utilization in a B&BR can be extremely high and even the spent nuclear fuel of a B&BR can be re-used as a fuel to spawn the next generation B&BR after appropriate reprocessing or reconditioning. In this paper, a super-simplified melt and treatment (SSMT) process, which removes volatile elements only from the spent fuel, is suggested to enhance the proliferation-resistance and economy of the reprocessing. The neutronic feasibility of B&BR self-sustainability with SSMT is studied in terms of the burnup reactivity change, conversion ratio, core lifetime, power profiles and safety parameters. The fuel and core design was optimized to maximize the self-sustainability while preserving the inherent proliferation-resistance of the core.

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