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Comparison of fast reactors performance in the closed U-Pu and Th-U cycle

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Breeding as well as burning capabilities of a reactor operated in the U-Pu or Th-U closed fuel cycle can be estimated from its equilibrium cycle parameters. In this study the equilibrium parameters were simulated for 8 selected fast reactors and both U-Pu and Th-U closed fuel cycles. For simplicity, the fission products were neglected and the reactors were represented only by infinite lattice.

It was found that the mass flow is stabilized in equilibrium closed cycle. The fuel composition does not differ between two consecutive cycles and determines the excess reactivity. This reactivity can serve as a measure for breeding or burning capabilities of each reactor. For a breeder reactor it should be high enough to accommodate the expected fission products and the presumed neutron leakage. The study provided insight for the differences between the 8 fast reactors and also between the U-Pu and Th-U closed fuel cycles.

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