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Feasibility and Challenges for Self-sustainable Long-Life SMR without Refueling

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This talk is concerned with feasibility and challenges for a self-sustainable fast-spectrum SMR (Small Modular Reactor), which can be operated without any refueling and reprocessing during the whole plant lifetime of ~50 years. For a competitive and proliferation-resistant fast-spectrum SMR, long-life core designs are reviewed and a compact SMR design is introduced and its design features and performances are discussed in terms of the core lifetime, fuel burnup, and inherent safety characteristics etc. Major technical challenges for the ultra-long-life SMR are discussed, which include lifetime of the fuel, coolant void reactivity, very high fuel burnup, passive decay heat removal, etc. In addition, self-sustainability of the long-life SMR is addressed in view of spent fuel recycle in an extremely simplified and clearly proliferation-resistant way. A super-simple melt-treatment of metallic spent fuels are introduced in this presentation for the self-sustainability of the fast-spectrum SMR.

Country/Int. Organization

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