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New stage on the neutronics and thermal hydraulics analysis of a Small Modular Reactor core

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Building on the success of the large nuclear plants, SMRs offer the potential to expand the use of clean, reliable nuclear energy to a broad range of customers and energy applications. In this work, a model to describe the neutronics parameters of a SMR core that can produce up to 530 MW of thermal power was developed. Using this model, several configurations of fuel enrichment to obtain the most homogeneous distributions of the power inside the fuel assemblies during all the core lifetime were studied. Temperature reactivity coefficients and mass variation of the principal isotopes for the optimized core were calculated. Finally, thermal hydraulics studies of the highest temperature section in the core was performed to obtain the temperature distributions in the fuel, in the moderator and the radial temperature distribution inside the hottest pin of the fuel assembly was obtained.

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