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Sensitivity studies of SFR unprotected transients with global neutronic feedback coefficients

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Improvements on SFR design are expected to meet the safety goals of GEN IV reactors. One main objective is to enhance the core behavior during unprotected transients to increase the level of prevention of severe accidents. However, performing a detailed safety analysis for all initiators requires many multiphysical analyses and is a rather lengthy process when designers need to assess safety trends quickly. To compare some core design options from a safety point of view, simplified modeling using the global neutronic feedback coefficients is able to estimate the core behavior during unprotected transients. The paper explains how to use these coefficients to provide some trends for these transients like loss of flow (ULOF) or loss of heat sink (ULOHS). Main parameters to optimize the inherent safety of SFR cores are discussed to show for example that the primary pumps halving time is not always the key for improving the ULOF behavior. The paper shows that the ULOF inherent behavior of a core can be driven by one single coefficient. The paper gives also some validation insights of this methodology and an analytical comparison of some French SFR cores is made.

Country/Int. Organization

France
CEA Cadarache

Primary author: Mr GAUTHÉ, Paul (CEA)

Co-author: Mr SCIORA, Pierre (CEA)

Presenter: Mr GAUTHÉ, Paul (CEA)

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