Contribution ID: **138** Type: **POSTER**

Passive Complementary Safety Devices for ASTRID severe accident prevention

Tuesday 27 June 2017 17:30 (1h 30m)

Sodium-cooled Fast Reactors (SFR) is one of the Generation IV reactor concepts. It has been selected to secure the nuclear fuel resources and to manage radioactive waste. In this context, the CEA (French Commission for Atomic Energy and Alternative Energy) with its partners is involved in a substantial effort on the ASTRID (Advanced Sodium Technological Reactor for Industrial Demonstration) Project.
ASTRID core design is mainly guided by safety objectives. The first one is prevention of the core meltdown accident, at first through natural favourable behaviour of the core and of the reactor, and with the addition of passive complementary systems if natural behaviour is not sufficient for some transient cases. The second one is the mitigation of the severe accident to guarantee that core melting accidents do not lead to significant mechanical energy release.
The robust safety demonstration is supported by complementing ASTRID core with two types of Complementary Safety Devices dedicated to core damage prevention that would passively shut down the reactor. The first type is based on the Curie point use of electromagnetic devices that hold some specific ASTRID shutdown systems to address unprotected loss of heat sink transients (ULOHS). The second type is a hydraulically suspended absorber rod subassembly, called RBH, dedicated to unprotected loss of flow (ULOF) transients; under normal operation, the absorber rod subassembly is hydraulically suspended above the core by the upward flow of the sodium coolant. Should an ULOF event and the associated drop in flow rate occur, this upward force would become insufficient, thus allowing the absorber insertion into the active core region by gravity.
This paper presents a state of the art on simulations of accidental transients using CATHARE2 system code. It has been demonstrated that these Complementary Safety Devices, for ASTRID severe accident prevention, achieve absence of sodium boiling (ULOF) and limitation of the reactor temperature (ULOHS).

Country/Int. Organization

Commissariat à l'Énergie Atomique et aux Énergies Alternatives
13108 Saint-Paul-Lez-Durance

Author: Mr SAEZ, Manuel (CEA)

Presenter: Mr BISSEN, Edouard (CEA)

Session Classification: Poster Session 1

Track Classification: Track 3. Fast Reactor Safety