Similarly to the development of traditional safety systems, passive safety components (devices) shall be designed according to the essential requirements of the nuclear regulations of the Russian Federation.

Along with moving away from the traditional approach to ensuring safety, certain regulatory requirements need to be revised. Some of these have been introduced in response to the peculiarities of traditional safety system devices and are inapplicable to new devices. For example, in view of the expectedly (justified) low probability of failure, the requirement for periodic serviceability inspections of event-actuated passive devices is often needless.

ix. Slovakia

Proposal of movable reflector for fast reactor design
B. Vrban, Slovak University of Technology

Since the transient behaviour of the reactor core depends also on the fraction of neutrons that leak out of the core, the core control and reactivity management may benefit from a system of partially moveable reflector incorporated in the design. In fast reactors a larger migration area leading to a significant leak of neutrons can be observed because especially the transport cross-sections are in general smaller as compared to light water reactors. The utilization of a moveable reflector system in conjunction with dedicated safety control rods can increase the ability of accident managing due to enhanced escaping neutrons which otherwise would be reflected back into the fuel zone. The paper demonstrates the possibility of better controlling the transient reactor by additionally moving selected reflector subassemblies equipped with the neutron trap. The main purpose of the analysis of the Gas-cooled Fast Reactor (GFR) presented in the full paper is investigation of the kinetic parameters and of the control and reflector rod worth, as well as optimization of the parts used for partial reflector withdrawal. The results found in this study may serve for future design improvements of other designs such as the liquid metal cooled fast reactors are.

x. Sweden

Autonomous Reactivity Control (ARC) Systems
Staffan A. Qvist, Uppsala University

The next generation of nuclear energy systems must be licensed, constructed, and operated in a manner that will provide a competitively priced supply of energy, keeping in consideration an optimum use of natural resources, while addressing nuclear safety, waste, and proliferation resistance, and the public perception concerns of the countries in which those systems are deployed. These issues are tightly interconnected, and the implementation of passive and inherent safety features is a high priority in all modern reactor designs since it helps to tackle many of the issues at once. To this end, the Autonomous Reactivity Control (ARC) system was developed to ensure excellent inherent safety performance of Generation-IV reactors while having a minimal impact on core performance and economic viability. Properly designed, the ARC-system can act as a thermostat in the core, autonomously controlling temperature without the need for any operator action, electrical systems or indeed any moving mechanical parts. This actuation responds to