

Conceptualisation of Stroke Limiting Device for Control & Safety Rod Drive Mechanism of Sodium Cooled Fast Reactor

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Abstract

PFBR, India's first commercial fast breeder reactor is equipped with two independent, fast acting and diverse shutdown systems. A shutdown system comprises of sensors, logic circuits, drive mechanisms and neutron absorbing rods. The absorber rods of the first shutdown system are called as Control & Safety rods (CSR) and their drive mechanisms are called as Control & Safety Rod Drive Mechanisms (CSRDM). CSR are normally partially inserted in the active core & held by CSRDM. CSR and its Drive Mechanism (CSRDM) are used for reactor control and for safe shutdown of the reactor by scram action. The safety of the reactor is primarily dependent on shutdown system and heat removal system; hence these systems should be highly reliable systems. In order to improve the safety of future reactors further, active and passive safety features are added to the existing shutdown system design. The stroke limiting device is one such active safety device which safeguards the reactor against Unprotected Transient Over Power (UTOP) event resulting from uncontrolled withdrawal of one control rod. It is an add-on device for CSRDM. This is a mechanical device, which physically limits the upward movement of CSR to a specified value and allows further upward travel on resetting by plant operator. The paper presents the principle & design features of SLD. Three concepts of SLD are discussed with their pros & cons

Keywords: Stroke limiting device, CSRDM, CSR, Fast reactor, PFBR

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