Reactor Control System & Shutdown Mechanisms

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Table of Contents

1 Quiz

1.1 Questions

1. A neutron has a mean lifetime of 7×10^{-6} s. Determine the reactor period if the reactivity is 0.01. Take $\beta=0.0065$ and $l_d=12.7$ s

2. Mention the categories of functions of reactor control system.

3. What is meant by moderator dump in PHWR?

4. Name the various shutdown states in PHWR.

5. Name the shutdown systems in a typical PHWR.

1.2 Answers

1. $\rho=(k-1)/k$
$k=1/(1-\rho)=1/(1-0.01) = 1.0101$
$k-1=0.0101>\beta$
Therefore,
$T=l/(k-1)= 7e-6/(1.0101-1) = 6.93 \times 10^{-4}$ s

2. (i) regulation function (ii) protection function

3. When a large reduction in reactivity is required, the moderator can be removed from the reactor core within few seconds. This is called 'dumping' the moderator.

4. (i) hot shutdown state; (ii) cold shutdown state and (iii) guaranteed shutdown state

5. (i) Primary Shutdown System (PSS); (ii) Secondary Shutdown System (SSS) (iii) Automatic Liquid Poison Addition System (ALPAS)