

**ANALISIS PARAMETER TERMAL HIDRAULIKA SISTEM PRIMER
TERTUTUP REAKTOR KLT-40S SAAT KONDISI TRANSIEN
COASTDOWN POMPA PENDINGIN REAKTOR**

Oleh

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INTISARI

Penggunaan *floating nuclear power plant* (FNPP) atau reaktor nuklir terapung dapat memenuhi pemenuhan listrik regional yang berukuran menengah ke bawah. Reaktor KLT-40S merupakan FNPP berdaya termal 150 MWt yang didesain oleh *OKBM Afrikantov* Rusia. Penelitian bertujuan untuk melihat bagaimana respon parameter termal hidraulika operasi reaktor saat terjadi kondisi transien berupa *Anticipated Operational Occurance* (AOO) dan saat terjadi *Anticipated Transient Without SCRAM* (ATWS) pada reaktor KLT-40S.

Penelitian dilakukan menggunakan kode program RELAP5-3D dengan *running time* selama 100 detik. Kondisi AOO yang dilakukan adalah ketika terjadi *coastdown* pompa pendingin reaktor. Simulasi divariasikan terhadap jumlah pompa yang mengalami *coastdown* serta keberadaan *pressurizer* pada kalang yang terdampak *coastdown* pada masing-masing variasi. Pada percobaan kali ini trip SCRAM teraktifasi ketika temperatur bahan bakar, tekanan dan level air *pressurizer* mencapai 700 K, 14 MPa, dan 85%. Kondisi ATWS dilakukan pada setiap simulasi yang mengalami SCRAM.

Hasil percobaan parameter operasi reaktor pada saat simulasi *coastdown* sebanyak empat pompa tanpa SCRAM (ATWS) menunjukkan terjadinya kegagalan pada program ketika *running time* baru mencapai 18,51 detik atau 13,51 detik setelah terjadi *coastdown*. Adapun temperatur pusat bahan bakar, tekanan sistem, level dan air teras ketika program berhenti masing-masing senilai 995,97 K, 19,85 MPa dan 68,76%.

Kata kunci: KLT-40S, termal hidraulik, pompa, *coastdown*, RELAP5-3D

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ABSTRACT

ANALYSIS OF THERMAL HYDRAULICS PARAMETER OF CLOSED PRIMARY SYSTEM OF KLT-40S REACTOR DURING MAIN COOLANT PUMP COASTDOWN TRANSIENT

by

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ABSTRACT

The use of floating nuclear power plants (FNPP) or floating nuclear reactors can meet the fulfillment of regional electricity in the middle and lower sizes. The KLT-40S reactor is a 150 MWt thermal powered FNPP designed by OKBM Afrikantov of Russia. The aims of this research were to see how the response of the reactor's thermal hydraulic parameters during transient conditions in the form of Anticipated Operational Occurance (AOO) and when Anticipated Transient Without SCRAM (ATWS) occurs on the KLT-40S reactor.

The study was conducted using the RELAP5-3D program code with running time for 100 seconds. The AOO condition that conducted in this research was the coastdown of the reactor coolant pump. The simulation was varied with the number of pumps that underwent coastdown the simulation also varied with the presence of pressurizer in the impacted loop. In this experiment the SCRAM trip would be active when fuel temperature, pressure and water level of the pressurizer reached 700 K, 14 MPa, and 85%. ATWS conditions were performed on every simulation that experiences SCRAM.

The results of the reactor operating parameters during the coastdown of four pumps without SCRAM (ATWS) shows a failure when the running time reached 18.51 seconds or 13.51 seconds after the coastdown occurred. The core temperature of the fuel, system pressure, level and core water when the program stops are 995.97 K, 19.85 MPa and 68.76% respectively.

Keywords: KLT-40S, thermal hydraulics, pump, coastdown, RELAP5-3D

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