

ABSTRAK

DESAIN INTI (*CORE*) TIGA DIMENSI (X-Y-Z) REAKTOR SCWR (*SUPER CRITICAL WATER-COOLED REACTOR*) MENGGUNAKAN THORIUM HASIL DAUR ULANG

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Penelitian mengenai desain inti (*core*) reaktor SCWR tiga dimensi (X-Y-Z) menggunakan thorium hasil daur ulang telah selesai dilakukan. Analisis neutronik menggunakan program SRAC. Parameter yang dianalisis pada penelitian ini meliputi pengayaan bahan bakar, ukuran teras reaktor, konfigurasi teras reaktor, kekritisan, dan distribusi rapat daya. Desain teras reaktor diterapkan pada 1/8 bagian teras reaktor dengan geometri tiga dimensi (X-Y-Z) *slab*. Bahan bakar yang digunakan yaitu thorium dengan *burn* 20 GWd/t sebagai *inner fuel*, *burn* 30 GWd/t sebagai *outer fuel*. Selongsong menggunakan *zirconium* dan pendingin menggunakan air ringan (H₂O). Kondisi kritis reaktor didapatkan pada $x = 310$ cm, $y = 170$ cm, $z = 190$ cm dan pengayaan bahan bakar 2,49%. Daya teras reaktor pada penelitian ini sebesar 3.411 MWt dengan nilai rapat daya maksimal 366,8356 Watt/cm³ yang terletak pada titik $x = 34$ (170 cm), $y = 1$ (5 cm), $z = 38$ (190 cm) dan faktor multiplikasi efektif (k_{eff}) sebesar 1,000000.

Kata kunci: desain teras reaktor, rapat daya, SCWR, thorium.

ABSTRACT

THREE-DIMENSIONAL (X-Y-Z) CORE DESIGN OF SCWR REACTOR USING THORIUM RECYCLED

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The research of three-dimensional (X-Y-Z) core design of SCWR reactor using thorium recycled has been done. Neutronic calculations were calculated by SRAC program. Parameters of this research were fuel enrichment, core reactor sizes, core reactor configurations, criticality, and power density distribution. The desain of core reactor was 1/8 three-dimensional (X-Y-Z) slab. Fuel reactor was thorium 20 GWd/t burn as inner, and 30 GWd/t burn as outer. Zirconium as cladding, and light water as coolant. Critical condition was achieved at $x = 310$ cm, $y = 170$ cm, $z = 190$ cm and 2,49% of fuel enrichment. Core power reactor was 3.411 MWt, maximum power density was 366,8356 Watt/cc located at $x = 34$ (170 cm), $y = 1$ (5 cm), $z = 38$ (190 cm) and multiplication factor effective (k_{eff}) value was 1.0000000.

Keyword: core design, power density, SCWR, thorium.