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Mechanical Design Evaluation of Fuel Assembly for PGSFR

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The PGSFR core is a heterogeneous, uranium-10% zirconium (U-10Zr) metal alloy fuel design with 112 assemblies: 52 inner core fuel assemblies, 60 outer core fuel assemblies (FA), 6 primary control assemblies (CA), 3 secondary control assemblies, 90 reflector assemblies (RA), and 102 B4C shield assemblies (SA). The core is designed to produce 150 MWe with an average temperature rise of 155 °C. The inlet temperature is 390 °C and the bulk outlet temperature is 545 °C. The core height is 900 mm and the gas plenum length is 1,250 mm. The fuel assembly is composed of the several structural parts, which are the handling socket, upper/lower reflector, nose piece, hexagonal duct and fuel rods. The face to face dimension and the length are 132.36 mm and 4,550 mm, respectively.

In this paper, there are two kinds of analyses for mechanical design and evaluation of FA. One is the dynamic behavior analysis of FA and the other is the structural analysis of FA components as design level. All of these analyses results will be verified by out-pile test of actual size test FA.

Country/Int. Organization

Rep. of Korea

Primary author: Dr YOON, Kyungho (Korea Atomic Energy Research Institute)

Co-authors: Dr LEE, Hyunseung (Korea Atomic Energy Research Institute); Dr CHEON, Jinsik (Korea Atomic Energy Research Institute)

Presenter: Dr YOON, Kyungho (Korea Atomic Energy Research Institute)

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