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Effect of coolant mass flow rate on flow pulsation in a simplified channel system of CFETR WCCB blanket

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Water cooled ceramic breeder (WCCB) blanket is being developed for China Fusion Engineering Test Reactor. The water with inlet temperature of 285℃ and pressure of 15.5MPa is adopted to remove the considerable heat in the blanket, which may boil under the accident condition of loss of coolant. Periodic flow pulsation may be generated in the parallel coolant channels of the blanket. As a result, structural temperature of the blanket may exceed the limit and the structure may even be burned down. Therefore, flow pulsation in the blanket is necessary to be studied from safety point of view. In this contribution, the effect of coolant mass flow rate on the flow pulsation in the WCCB blanket was analyzed by numerical simulation. In order to facilitate comparison with future experiments, the geometric model of a simplified coolant channel system was built. The channel system includes three groups of parallel double channels corresponding to the channels of first wall, cooling plate and stiffening plate, respectively, and four manifolds. The boundary mass flow rate of flow pulsation was obtained. Combined the amplitude and period of flow pulsation with the details of flow in the different kinds of channels, the formation mechanism of flow pulsation was addressed.

Eligible for student paper award?

No

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