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池式反应堆堆内流场数值模拟

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摘要 以板型燃料组件池式反应堆为研究对象,采用计算流体动力学程序CFX5对堆内流场进行了数值模拟,结果表明:流过堆芯燃料组件的流速较大,在燃料组件出口位置流速达到最大值;无论是否带有围桶,堆内压降均主要集中在堆芯燃料组件上,入口流量增大,堆芯燃料组件上的压降随之增加;堆芯上部腔室和下部腔室的压力变化很小;在相同的入口流量下,带与不带围桶的堆芯进出口差压非常接近。

关键词 池式反应堆 堆内流场 数值模拟 计算流体动力学

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Numerical Simulation on Flow Field of Swimming Pool Reactor

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Abstract The swimming pool reactor with planar fuel assembly was studied with the computational fluid dynamics program CFX5, and the flow field in reactor was numerically simulated. The results show that the velocity in fuel assembly is high, and the velocity reaches its maximum value at the outlet of the fuel assembly. Whether or not the reactor is installed with enclosure, the main pressure drop is focused in the fuel region. The pressure drop in the fuel region increases with the increase of the entry flowrate. The pressure at the upper and lower cavities in pressure vessel varies little. The differential pressure between inlet and outlet of the reactor core with enclosure is closed to the differential pressure without enclosure at the same entry flowrate.

Key words swimming pool reactor flow field numerical simulation computational fluid dynamics

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