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Crossflow between subchannels in a 5 x 5 rod-bundle geometry[1]

JUNGJIN LEE, HYUNGMIN PARK, Seoul National University — In the present study, we experimentally investigate the single-phase (water as a working fluid) flow in a vertical 5 x 5 rod-bundle geometry using a particle image velociemtry, especially focusing on the crossflow phenomena between subchannels. This crossflow phenomena is very important in determining the performance and safety of nuclear power plant. To measure the flow behind the rod, it is made of FEP (Fluorinated Ethylene Propylene) to achieve the index matching. The ratio of pitch between rods and rod diameter is 1.4, and the considered Reynolds number based on a hydraulic diameter of a channel and an axial bulk velocity is 10000. Also, the typical grid spacer is installed periodically along the streamwise direction. Depending on the location of subchannel (e.g., distance to the side wall or grid spacer), the flow (turbulence) statistics show large variations that will be discussed in detail. Furthermore, we will suggest a modified crossflow model that can explain the varying crossflow phenomena more clearly.

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