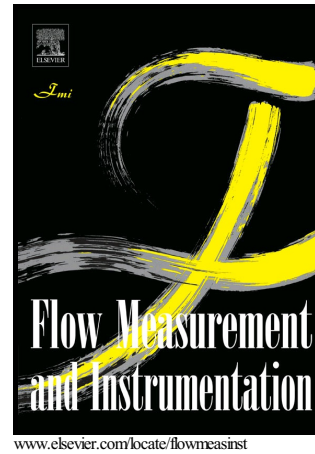


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Using Dividing Discharge Streamline Concept for Estimating Diverted Discharge in Mesh-Panel Bottom Racks

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## Using Dividing Discharge Streamline Concept for Estimating Diverted Discharge in Mesh-Panel Bottom Racks

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### Abstract

Bottom intakes are steel structures that are placed in river beds in order to divert flow to small hydropower plants or low-level lands. In this study, a new method for estimating diverted discharge flow by mesh-panel bottom intakes (which consists of longitudinal bars along the river over transverse bars perpendicular to the river flow) was introduced and evaluated based on the concept of dividing the discharge streamlines. This streamline is a singular streamline that has been terminated with the downstream end of bottom intake such that the streamlines that are lower than it is all collected and diverted by the bottom intake, while the streamlines that are above it, pass over the intake. In this research, three mesh-panel bottom intakes, with different void ratios, were made and installed in a flume with various slopes. In total, 81 series of experiments were conducted by passing different discharges of clear water and various lengths of mesh-panel bottom intakes. Then, the empirical regression equation was extracted between the height position of the dividing streamline, the geometric variables of bottom intake, and the hydraulic parameters of the approaching flow by using dimensional analysis. Subsequently, the diverted discharge flow, using mesh-panel bottom intake, was calculated by integrating the equation of deep-velocity distribution at the upstream of the mesh-panel bottom intake from the channel bed to the dividing streamline position. Finally, the efficiency of the discharge dividing streamline method of estimating the diverted discharge by the mesh-panel bottom intake is compared to the classic method of

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