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Discharge Distribution in Open-Channel T-Shape Bifurcations: Effect of a Reduced Side Branch Width

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Abstract

The primary challenge for river managers in handling open-channel bifurcations is the prediction of the discharge distribution to downstream branches. In this study, we aimed to summarize and complete the available database and empirical correlations for T-shape bifurcations at 90°, both in subcritical and transcritical flow regimes, in equal and reduced side branch width geometries. An experimental campaign generated a database of 668 new configurations in addition to 299 sets collected from the literature. The existing correlation for predicting the discharge distribution in the subcritical regime appears to be of limited agreement with these data, whereas a new empirical relationship significantly increases the accuracy and is useful for a side branch as narrow as a third of the main branch width. Regarding the free-recirculation transcritical regime, the present data validate the correlation proposed in 1967 for downstream branch ratios not tested by the authors. An approach was proposed to predict the flow discharge distribution for configurations without *a priori* knowledge of the flow regime.

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