

## Hydrodynamics of Shear Layers at River Confluences by Formation of Secondary Circulation

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**Abstract :** River confluences are areas where there is a lot of mixing, which is often caused by the formation of shear layers and helical motions. The hydrodynamics of secondary circulation at river confluences with low flow discharge ratios and a 90° junction angle are investigated in this study. The analysis is based on Delft 3D modelling, which includes a three-dimensional time-averaged velocity field, turbulence, and water surface levels that have been validated using laboratory data. Confluence structure was characterized by shear layer, secondary circulation, and mixing at the junction and post confluence channel. This study analysis formation of the shear layer by generation of secondary circulations in variation discharge ratios. The values of streamwise, cross-wise, and vertical components are used to estimate the secondary circulation observed within and downstream of the tributary mouth. These variables are estimated for three horizontal planes at  $Z = [0.14; 0.07; 0.02]$  and for eight cross-sections at  $X = [-0.1; 0.00; 0.10; 0.2; 0.30; 0.4; 0.5; 0.6]$  within a range of  $0.05 \leq Y \leq 0.30$ .

**Keywords :** river confluence, shear layer, secondary circulation, hydrodynamics

**Conference Title :** ICHWE 2022 : International Conference on Hydraulics in Water Engineering

**Conference Location :** New York, United States

**Conference Dates :** December 09-10, 2022