

## Experimental investigation of velocity profiles and turbulence characteristics in gradual channel transitions

Yongyan Wu, Yongcan Chen, and Zhaowei Liu

State key laboratory of hydroscience and engineering, Tsinghua University, Beijing, China (1031880619@qq.com)

Channel contractions are widely used in water transfer projects due to topographical and geological restrictions. Short transitions would lead to water surface fluctuations, higher turbulence and other undesirable effects. To investigate the velocity profiles and turbulence characteristics along different transitions, two set of experimental models were established, with one representative of long gradual transition and the other one of short gradual transition. A two-dimensional electromagnetic current meter ACM2-RS was used to measure the velocity along the centerline. Results show that the mean velocity increases along the contraction while the longitudinal turbulence intensity decreases. The decrease of longitudinal turbulence intensity can be explained by vortex stretching mechanism and rapid distortion theory. Affected by secondary currents in the contraction, the maximum velocity occurs below the surface. The shorter transition is, the stronger secondary circulation is, and the lower the maximum velocity is located.