The Influence of Large Roughness Elements on the Velocity Distribution in Streams

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Abstract

Producing a local control can significantly increase the variation in velocity of the flow surrounding rocks (large roughness elements) in a river, which is important as fish and invertebrates require variation in velocity in their habitat in order to survive and to breed. Thus the creation of a local control in a rehabilitated river will be useful for encouraging the formation of a natural habitat in that river. This report details research carried out on the velocity distribution around two protruding cylinders, representing large roughness elements, placed perpendicular to the flow in a laboratory flume. The research is conducted mainly by two-dimensional computer modelling in RiverFLO-2D, which is verified by laboratory experiments. The results of the computer modelling confirm that a greater variation in velocity occurs when a local control is present, and also produce guidelines for producing a local control in the specific case studied. These guidelines include placing two obstructions side-by-side in a flow whose base Froude Number is greater than 0.6. To increase the maximum Froude Number once a local control is created, the obstructions may be moved closer together. This will also increase the variation in velocity around the obstructions.