

Rock Grade Control Structures and Stepped Gabion Weirs: Scour Analysis and Flow Features

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A b s t r a c t

Rock and stepped gabion weirs are peculiar hydraulic structures that received relatively little attention in technical literature. Nevertheless, they can be successfully used for river restoration instead of traditional hydraulic structures. They have the advantage of being elastic structures and to preserve the natural environment. They can easily adapt to the *in situ* conditions and can be effortlessly modified according to the different hydraulic or geometric conditions which can occur in a natural river. The present study aims to analyze the effects of their presence on flow pattern and on the scour hole occurring downstream. The analysis involved scour processes, hydraulic jump types, stilling basin morphology and flow patterns. Two different hydraulic jump types were distinguished and classified. It was shown that the flow regime deeply influences the scour process, which evolves much more rapidly when a Skimming Flow regime takes place. Empirical relationships are proposed to evaluate maximum scour depth, maximum axial length, and non dimensional axial profiles.

Key words: flow pattern, hydraulic jump, scour, stepped gabion weir.