

FLOOD IMPACT ON STABILITY AND SAFETY OF HYDRAULIC STRUCTURES IN FLOW

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Key Words: flood, river, abutment, scour, risk assessment

Abstract

The flood damage of engineering structures in rivers because of scour near pumping stations, bridge structures – abutments, guide banks, dams, etc. leads to considerable environmental and economical losses. The reason of scour is multiple floods and therefore scour hole parameters near structures under clear-water conditions are summed up and increase from flood to flood. When depth of scour hole reaches critical value for foundations, structure usually is destroyed. To estimate the engineering structures safety and stability the flood damage risk assessment should be performed and in necessary cases protection measures should be used to prevent engineering structures from failure. A method for flood damage risk assessment at abutments is presented. We propose to calculate flood damage risk factor using two scour calculation methods: calculation method of scour development at abutments during the multiple floods and calculation method of equilibrium depth of scour at abutments. The theoretical analysis of the equilibrium depth of scour calculation method is made. The flood damage risk factor of abutment can be calculated as a ratio between h_s , the scour depth during/after the multiple floods of certain probability, and $h_{equil.}$, the equilibrium depth of scour hole at the abutments of the same probability. For critical conditions, when the developed scour hole is close to the equilibrium conditions, emergency protection measures should be taken and such bridge construction should be included into flood damage risk map.