Numerical Simulation of turbulent flow and sediment transport around real-life stream restoration structures\textsuperscript{1} ALI KHOSRONEJAD, FO-TIS SOTIROPOULOS, St. Anthony Falls Laboratory, University of Minnesota — Local scour around three real-life in-stream restoration rock structures, including a rock-vane, a cross-vane, and a J-hook, is investigated numerically. To overcome the difficulties of generating high quality boundary-fitted meshes in natural mobile-bed channels with embedded rock structures, we employ the fluid-structure interaction Curvilinear Immersed Boundary (CURVIB) method adapted for morphodynamic simulations (Khosronejad et al., Adv. Water Res., 34(7) 2011). The mobile bed and the immersed structures are discretized with an unstructured triangular mesh and are treated as sharp-interface immersed boundaries embedded in a background curvilinear mesh used to discretize the fluid domain. The flow field is simulated by solving the unsteady RANS equations closed with the k-w turbulence model. The bed evolution is calculated by solving the Exner equation using an unstructured, finite-volume formulation. Comparisons with measurements show that the computed results capture both the spatial and temporal features of scour and deposition patterns with good accuracy.

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