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Numerical Simulation of turbulent flow and sediment transport around real-life stream restoration structures¹ ALI KHOSRONEJAD, FOTIS 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- ω 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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