

Abstract Submitted  
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**Curvilinear Immersed Boundary Method for Simulating Sediment Transport and Scour in Open Channel Flows**<sup>1</sup> ALI KHOSRONEJAD, SEOKKOO KANG, IMAN BORAZJANI, FOTIS SOTIROPOULOS, St. Anthony Falls Lab, University of Minnesota — The fluid-structure interaction curvilinear immersed boundary numerical method of Borazjani et al. (J. Comp. Physics 2008) is extended to simulate coupled flow and sediment transport phenomena. The method is inherently suited for carrying out coupled flow/morphodynamics simulations in natural waterways with arbitrarily complex bed bathymetry and embedded hydraulic structures as it eliminates the need for the mesh to conform to the continuously evolving bed forms. The URANS equation with the k-w turbulence model with wall functions is used for turbulence closure. The Exner equation is discretized using an unstructured finite-volume formulation to determine the dynamic deformation of the bed. The physical phenomenon of sand-slide at places with steep bed slope is accounted for by implementing a mass-balance based algorithm. The flow field and bed morphodynamics equations are coupled using a partitioned loose-coupling approach. The predictive capabilities of the method are demonstrated by simulating the bed deformation in curved open channels with embedded hydraulic structures.

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