CONTINUOUS VERTICAL SORTING MODEL IN SRH-1D

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ABSTRACT

Reclamation's one-dimensional numerical hydraulics and sediment transport model, SRH-1D (Huang and Greimann, 2012), is used within Reclamation for its extensive capabilities, including the prediction of the routing of reservoir sediments as a result of dam removal. The development of SRH-1D over the past 15+ years has been important to the predictions of sediment-related impacts for several of Reclamation involved projects, which includes dam removal assessments for the Klamath River and Matilija Dam Removal studies, and continued monitoring of the removal of Glines Canyon and Elwha Dams on the Elwha River. Other studies include erosion downstream of Taiwan Dams, the Rio Grande River, and the San Joaquin River Restoration Project.

The current bed-material mixing algorithm in SRH-1D relies upon the active layer concept and this methodology has been observed to have difficulties simulating the change of the bed-material composition from a coarse, armored bed to a mixed bed of sand and gravel sized sediments. The current bed-material mixing algorithm requires the user-specified number of N layers, in which the bed is composed of one active layer and N-1 inactive layers. Most sediment models using the active layer concept simulating the release of finer sediments over a coarse armor layer are 'tricked' by making the initial armor immobile and giving the initial active layer an averaged grain size distribution of the reservoir sediments. This workaround keeps the pre- and post-dam release bed layers separate, thereby accurately simulating the transport of finer grained sediments, but neglects the potential mobility of the armor layer after finer-grained sediments are transported through the system.

Current research is developing and applying a continuous vertical sorting model in SRH-1D, with potential of incorporation into Reclamation's two-dimensional hydraulics and sediment transport model, SRH-2D (Lai, 2008). A continuous vertical sorting model was most recently proposed in Merkel and Kopmann (2012). This continuous vertical sorting model (or algorithm) has the ability to account for multiple sediment layers of varied thickness and gradation that are continuously depositing and eroding through time, thereby yielding a temporally and spatially varied stratigraphy of sediment layers. This method automatically keeps the coarse pre-dam removal armor layer separate from the finer sediment layers deposited and eroded from the channel. The research model is being tested against field and laboratory data.

REFERENCES

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