Quasi-two-dimensional simulation of scour and deposition in alluvial channels


ISSN: 0733-9429 CODEN: JHEND8

Publisher: ASCE

Abstract: Most existing sediment routing models are one-dimensional models and hence they cannot be used to simulate lateral channel bed deformations. Conversely, a two-dimensional model is computationally time consuming, and is not suitable for long-term simulation. Using the stream tube concept, a one-dimensional model is extended to a quasi-two-dimensional model in this study. It is capable of simulating lateral variations of channel cross section through the adjustments of stream tube boundaries. The model has an option to treat the suspended load and bed load separately and hence is able to simulate the deposition behavior of the suspended sediment under a nonequilibrium process. The model also provides options to solve either the Saint Venant equation or energy equation and hence can be applied in both steady and unsteady flow conditions. An assessment of this model's performance has been conducted through a comparison to an analytical solution and a set of experimental data. The application of this model to the Keelung River and the Shiemen Reservoir in Taiwan also gave convincing results.