Applications of GSTARS Computer Models

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Abstract. The Generalized Sediment Transport model for Alluvial River Simulation (GSTARS) is a series of computer models developed by the Bureau of Reclamation for solving sedimentation, river morphology, and river engineering problems of alluvial rivers and reservoirs. GSTARS utilizes the stream tube concept to simulate and predict the hydraulic conditions using a one-dimensional approach along stream tubes and provides a semi-two-dimensional variation of the hydraulic conditions in rivers and reservoirs. The hydraulic conditions coupled with the uneven erosion and deposition processes along stream tubes can give us a semi-three-dimensional variation of the channel geometry and longitudinal bed profile.

The theory of minimum stream power is used in GSTARS for the determination of optimum channel geometry and shape. Most of the commonly used sediment transport formulas are included in GSTARS models for users to choose. GSTARS 2.1 emphasizes the erosion, sediment transport, and deposition processes in alluvial rivers. GSTARS3 expands the capabilities of GSTARS 2.1 with elaborate programs for the simulation and prediction of reservoir sedimentation processes. GSTARS 2.1 and GSTARS3 can be used for cohesive and non-cohesive sediment transport studies.

These two models have been used by government agencies, universities, researchers, and engineers around the world. Examples of applications will be used to illustrate the capacities of these two models.

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