MODELING UNSTEADY FLOWS IN LARGE BASINS: THE SANTA CRUZ EXPERIENCE

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A case study modeling unsteady flows in a basin in the semiarid Southwest is presented here. The site is the Upper Santa Cruz River basin upstream of the Town of Marana, in the vicinity of Tucson, Arizona. The evaluation uses novel techniques of mathematical modeling in a data-intensive computational environment to calculate frequency-based flows at specific locations. A computer model capable of simultaneously handling the complex topology of the entire basin is driven by 100-year frequency rainfall events of 24, 48 and 96-hour durations.

Introduction

The use of computational methods to evaluate the hydrology of large basins is currently enjoying wide acceptance among practicing engineers and flood hydrologists. For basins exceeding 1000 square miles, the task of simulating flood flows by the computational method can be exceedingly complex. Theestimation of hydrologic abstractions is difficult indeed, in light of the wide range of antecedent moisture conditions. However, other unresolved problems still remain, most notably the choice of spatial and temporal distribution of the input design storm, the channel routing parameters, and infiltration losses through the channel bed.

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