

Application of Mathematical Modeling to Study Flood Wave Behavior in Natural River as Function of Hydraulic and Hydrological Parameters of the Basin

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Abstract. This research concerns about the development and application of a mathematical model, based on the Saint-Venant hydrodynamic equations, to study the behavior of the propagation of a flood wave in Natural River. The model is capable of evaluating the behavior of the control variables related to the flow in terms of the hydraulic and hydrological parameters of the basin. The governing partial differential equations are solved with the aid of finite differences, and for the solution of the system of nonlinear algebraic equations the iterative Newton-Raphson algorithm is employed. A computer program QUARIGUA (Risk Quantitative Analysis of Flooding in Urban Rivers) is used to perform the simulations. To evaluate the behavior of the control variables, several scenarios for the main channel as well as for the flood waves are considered and different simulations are performed. The simulations demonstrate that roughness coefficient and bed slope of the channel play a strong game on the behavior of the flood wave propagation.

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