

## **A development of a fuzzy methodology to study the propagation of a flood wave in Potengi River, Rio Grande do Norte - Brazil**

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**Abstract.** A mathematical model based on the equations of hydrodynamics combined with the *fuzzy* set theory was formulated, for the flood wave propagation in natural rivers. The model is able to evaluate the behavior of the control variables as membership functions. For the solution of the model governing partial differential equations, the Finite Difference Method was used, and for the solution of the resulting system of nonlinear algebraic equations, the Newton-Raphson Iteration Method was used. The results show that the use of Fuzzy Set Theory in the Hydrodynamic model could be an available alternative to determination of the uncertainty and to the Fuzzy Risk Analysis in the flood wave propagation.

**Keywords:** Fuzzy Set Theory; Hydrodynamic Model; Flood wave control.

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