DETERMINATION AND ANALYSIS OF EXTREME EVENT FLOWS BY STOCHASTIC STORMS IN THE MISICUNI BASIN - COCHABAMBA, BOLIVIA

Claude Le Noir, Andrés Cardoso

ABSTRACT

The calculation of peak flows by means of stochastic generation of elliptical storms within the Misicuni basin was performed with the specialized software IT-LluviaNH and IT-Flood of the Inter-American Development Bank developed by the CAPRA platform, obtaining the characteristic PADF curves and 300 stochastic storm scenarios evaluated in the hydrological and hydrodynamic models resulting in hydrographs at the dam and sub-basin levels for different return periods. Peak flows were also determined by conventional methodologies relating to IDF curves and design storms. The graphical and numerical comparison of the hydrographs at the basin outlet made it possible to verify the variation between the methodologies applied and the impact on the dam spillway through the transit of floods over the reservoir. The stochastic peak flows were lower than those determined by conventional methodologies. This is due to the non-uniformity of precipitation intensities over the basin area. However, considering the simultaneity of independent extreme event scenarios in each sub-basin (applying very low percentages to the probability of exceedance), the maximum flows are similar between methodologies. Likewise, the projection of flows with return periods of 2, 5, 10, 20, 20, 50 and 100 years to return periods of 1000 and 10000 years was calculated for both methodologies. The impact of the maximum stochastic flows does not represent a risk for the dam spillway since they are lower than the design flow.

Keywords: PADF, Stochastic, Deterministic, Elliptical Rainfall.