



**Sexto**  
**Congreso Nacional de**  
Riego, Drenaje y Biosistemas  
COMEII- 2021 / Hermosillo, Sonora



**Artículo: COMEII-21046**

*Hermosillo, Son., del 9 al 11 de junio de 2021*

## **SIMULACIÓN DE PROCESOS HIDROLÓGICOS Y ESTRUCTURAS HIDRÁULICAS CON UN ENFOQUE INTERACTIVO**

## **SIMULATION OF HYDROLOGIC PROCESSES AND HYDRAULIC STRUCTURES USING AN INTERACTIVE APPROACH**

**Eduardo Jiménez Hernández<sup>1\*</sup>**

<sup>1</sup>Phd Student, Biosystems Engineering, University of Arizona. 1177 E. 4th Street, Shantz Building, Room 403, Tucson, AZ, USA 85721.

eduardojh@email.arizona.edu (\*Corresponding author)

### **Abstract**

In engineering is common to find computer systems for simulation of irrigation, hydraulic and hydrologic processes. This software is often offered in a specialized graphical user interface and limited by the options defined beforehand by the programmers. Programmers also determine the workflow, which typically includes data input, simulation runs, and analysis of results. However, modern interpreted programming languages such as MATLAB, R, Python or Julia, which are commonly used nowadays, allow an interactive style of simulation and analysis. This means simulations can be run step-by-step allowing changes in the simulation and model parameters, visualization and analysis of partial results, verification of intermediate calculations, and additional analysis or calculations not anticipated or provided by programmers. In this work an ongoing development of a Python 3 library is presented, which provides user friendly, flexible, and computationally efficient tools for simulation in hydrology, hydraulics, and irrigation. The library provides modules for the processing and analysis of climate data, estimation of hydrologic variables, design of hydraulic infrastructure, and more. There is no preset order in the calculations so users can define them according to their interests and needs. An advantage of this approach is the possibility of performing sensitivity analysis, uncertainty analysis, and optimization. The library is free and open-source software so it can be readily adapted to other needs and integrated to work with other Python modules or software.

**Keywords:** irrigation, optimization, Python, modeling