



Simultaneity of water demand from hydrants of distribution networks and operational irrigation-water balance

Raúl Sánchez, Leonor Rodriguez-Sinobas, Luis Juana, and Francisco V. Laguna

TECHNICAL UNIVERSITY OF MADRID (UPM), RESEARCH GROUP "HYDRAULICS FOR IRRIGATION",
DEPARTMENT OF CIVIL ENGINEERING: HYDRAULICS AND ENERGY

In pressure irrigation-water distribution networks, applied water volume is usually controlled opening a valve during a calculated time interval, and assuming constant flow rate. In general, pressure regulating devices for controlling the discharged flow rate by irrigation units are needed due to the variability of pressure conditions. A pressure regulating valve PRV is the commonly used pressure regulating device in a hydrant, which, also, executes the open and close function. A hydrant feeds several irrigation units, requiring a wide range in flow rate. In addition, some flow meters are also available, one as a component of the hydrant and the rest are placed downstream. Every land owner has one flow meter for each group of field plots downstream the hydrant.

Ideal PRV performance would maintain a constant downstream pressure. However, the true performance depends on both upstream pressure and the discharged flow rate. In this work the influence of the performance on the control of the applied volume during the whole irrigation events in an irrigation campaign has been assessed.

Theoretical flow rates values have been introduced into a validated in laboratory PRV performance model coupled with a water distribution network. Variations on flow rate are simulated by taking into account the consequences of variations on climate conditions and also decisions in irrigation operation, such as duration and frequency application. The model comprises continuity, dynamic and energy equations of the components of both the PRV and the network.