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Performance of pressure control valves and flow meters precision in operational irrigation-water balance accuracy

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In pressure irrigation-water distribution networks, pressure regulating devices for controlling the discharged flow rate by irrigation units are needed due to the variability of flow rate. In addition, applied water volume is used controlled operating the valve during a calculated time interval, and assuming constant flow rate. In general, 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. Its lecture could be used for refining the water balance but its accuracy must be taken into account.

Ideal PRV performance would maintain a constant downstream pressure. However, the true performance depends on both upstream pressure and the discharged flow rate. The objective of this work is to asses the influence of the performance on the applied volume during the whole irrigation events in a year.

The results of the study have been obtained introducing the flow rate into a PRV model. Variations on flow rate are simulated by taking into account the consequences of variations on climate conditions and also decisions in irrigation operation, such us duration and frequency application. The model comprises continuity, dynamic and energy equations of the components of the PRV.