



Experimental validation of a methodology to control irrigation canals based on Saint-Venant equations[☆]

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Abstract

This paper exposes and validates a methodology based on a classical hydraulic model (Saint-Venant equations) to design efficient automatic controllers for an irrigation canal pool. The method is applied on a laboratory canal located in Portugal. First, the full nonlinear hydraulic model is calibrated, using a single steady-state experiment, then it is validated on other hydraulic conditions. The control model is obtained by linearizing the Saint-Venant equations and using a numerical method to compute the frequency response of the system. Simple controllers are designed and analyzed using the linearized models. The experimental results show that such a method is able to accurately predict the closed-loop system behavior in terms of stability, robustness and performance.

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