The main goal in canal control for agricultural purposes is to minimize the water waste when supplying water to farmers. Since the off-takes are, in most cases, gravity fed, the requirement of being able to supply water has traditionally been converted into set-point regulation of water levels.

The main research focus is on the automation of irrigation canals to achieve a more efficient and effective water delivery. The available research on canal control algorithms can be grouped into four main categories: heuristics, PID-type, optimal, and predictive controllers. Despite the resulting improvement, mainly due to their robustness and ease to implementation in the field, the classical PI-controllers are still actual in canal control research mainly with the focus of enhancing the tuning of the controller gains.

In this paper a complete new platform connecting the SCADA supervisory system and the MATLAB software (named SCADA–MATLAB platform) is built, in order to provide the usual SCADA systems with the ability to handle complex control algorithms. The developed MPC-model presents a novelty in the control of irrigation canals as it allows the use of industrial PLCs to implement high complex controllers, through the new developed SCADA–MATLAB platform.

Experimental results demonstrate the reliability and effectiveness of the proposed strategy in real-life typical situations, including gate malfunctioning and extreme water off-take conditions.

© 2013 Elsevier Ltd. All rights reserved.