An application of a dynamical set point policy to main irrigation canals using in-line storage

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In this study a set of different set points are taken into account for several pools of the Dez irrigation canal. The set points are calculated according to the water demands that are expected during the next hours. The rationale behind considering a group of set points is that it can be interesting to store water into different pools, as in-line reservoirs, in order to reduce the delay time and to compensate possible mismatches between upstream supply and downstream demand. A severe and sudden increasing – decreasing flow schedule has been applied by using Sobek hydrodynamic model for normal operation and operation with using in-line storage. A controller is used to choose between these set points in order to obtain the highest possible control performance. To this end, we consider a model predictive controller that follows each of the set points. As a consequence, different control vectors are calculated and only the one that minimizes the expected cost is implemented. This policy is repeated in a receding horizon fashion each time step. Finally, in order to test the proposed technique, we have carried out different simulations that compare it with other popular techniques such as local feedback PI and standard MPC. The proposed method enables main irrigation canals continue to flow at night in large and medium size main canals.