



## **Short-term Operation of Multi-purpose Reservoir using Model Predictive Control**

Gokcen Uysal (1,2), Dirk Schwanenberg (3), Rodolfo Alvarado Montero (2), Aynur Sensoy (1), and Ali Arda Sorman (1)

(1) Anadolu University, Department of Civil Engineering, Eskişehir, Turkey (gokcenuysal@gmail.com), (2) University of Duisburg-Essen, Institute of Hydraulic Engineering and Water Resources Management, Essen, Germany, (3) KISTERS AG, Aachen, Germany

Operation of water structures especially with conflicting water supply and flood mitigation objectives is under more stress attributed to growing water demand and changing hydro-climatic conditions. Model Predictive Control (MPC) based optimal control solutions has been successfully applied to different water resources applications. In this study, Feedback Control (FBC) and MPC get combined and an improved joint optimization-simulation operating scheme is proposed. Water supply and flood control objectives are fulfilled by incorporating the long term water supply objectives into a time-dependent variable guide curve policy whereas the extreme floods are attenuated by means of short-term optimization based on MPC. A final experiment is carried out to assess the lead time performance and reliability of forecasts in a hindcasting experiment with imperfect, perturbed forecasts. The framework is tested in Yuvacık Dam reservoir where the main water supply reservoir of Kocaeli City in the northwestern part of Turkey (the Marmara region) and it requires a challenging gate operation due to restricted downstream flow conditions.