Development of a semi-automated model identification and calibration tool for conceptual modelling of sewer systems

Vincent Wolfs[1], Mauricio Florencio Villazon[2,3], Patrick Willems[4]

[1] University of Leuven, Hydraulics Section, Kasteelpark Arenberg 40, BE-3001 Leuven, Belgium
vincent.wolfs@bwk.kuleuven.be
[2] University of Leuven, Hydraulics Section, Kasteelpark Arenberg 40, BE-3001 Leuven, Belgium,
mauricio.villazon@bwk.kuleuven.be
[3] Universidad Mayor de San Simón, Hydraulics Laboratory, Petrolera Avenue Km 4.2 Cochabamba, Bolivia
[4] University of Leuven, Hydraulics Section, Kasteelpark Arenberg 40, BE-3001 Leuven, Belgium,
patrick.willems@bwk.kuleuven.be

ABSTRACT

Applications such as real-time control, uncertainty analysis and optimization require an extensive number of model iterations. Full hydrodynamic sewer models do not suffice for these applications due to the overlong computation time. Simplifications are consequently required. A lumped conceptual modelling approach results in a much faster calculation. The process of identifying and calibrating the conceptual model structure could, however, be time consuming. Moreover, many conceptual models lack accuracy, or do not account for backwater effects. To overcome these problems, a modelling methodology was developed which is suited for semi-automatic calibration. The methodology is tested for the sewer system of the city of Geel in the Grote Nete river basin in Belgium, using both synthetic design storm events and long time series of rainfall input. A MATLAB/Simulink® tool was developed to guide the modeller through the step-wise model construction, reducing significantly the time required for the conceptual modelling process.

KEYWORDS

Conceptual modelling; CSO; Semi-automatic calibration; Sewer system