

Effectiveness of parallel second order model over second and first order models

Ahmad Jabari Kohpaei, Arumugam Sathasivan*, Hanieh Aboutalebi

Curtin University, Department of Civil Engineering, Perth, WA, Australia
Tel. +61 (8) 9266-7296; email: s.sathasivan@curtin.edu.au

Received 28 July 2010; Accepted in revised form 26 December 2010

ABSTRACT

The chlorine decay is usually described by the first order model (FOM) due to its easiness, although its weaknesses are well known. In this work, two better models, second order model (SOM) and parallel second order model (PSOM), are compared for their accuracy to predict chlorine residuals for a single dosing scenario. Results showed that SOM model provided a better prediction compared to FOM. However, SOM had two important shortcomings. Firstly, it overly predicted residuals in the lower end of chlorine decay curve, implying false sense of security in achieving secondary disinfection goals. Secondly, when higher initial dose was practiced, chlorine residual prediction was poorer. PSOM on the other hand provided the best fit for the experimental data in the initial as well as the later part of the decay curve for any doses. Compared to SOM which had two parameters, PSOM is more complex as it uses four parameters. Comparing to the advantages, complexity of PSOM is not an issue as EPANET-MSX can be used for full scale system simulation.

Keywords: Disinfection; Chlorine decay; First order model (FOM); Second order model (SOM); Parallel second order model (PSOM); Parameter estimation; EPANET-MSX

* Corresponding author.