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Drinking Water Engineering and Science Discussions

Interactive comment on "Hydraulic modelling of drinking water treatment plant operations" *by* G. I. M. Worm et al.

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I found this paper highly confusing and poorly structured. Essentially, it is how to use EPAnet to represent the hydraulics for cascade aeration; rapid sand filters; tower aeration; and well abstraction.

Section 2 describes the use of four different valve models to represent different types of hydraulic behaviour. Aside from this there is no further discussion of the hydraulic elements. The description of the valve types is confusing. For example, we are told that a pressure sustaining valve (PSV) is defined as min(Hcalculated, Hspecified). However, there is no indication as to how the calculated head is reached. I assume that what is meant if that the *upstream* head is greater than the specified head then the PSV is regarded as throttling the valve to bring the downstream head into line with the specification.

The description of the throttle control valve suggests that the authors' are unfamiliar with the EPAnet modelling system. The head loss is defined as eta vˆ2 / 2 g; normally the parameter eta would be regarded as valve coefficient to relate the number of velocity heads (vˆ2 / 2 g) to the headloss. However, the authors describe eta as 'where the setting for the TCV is eta, which is constant for a valve with a fixed position.' While I can see what the authors mean it is a cumbersome approach that, as I wrote, indicates that the authors' are unfamiliar with the definition of eta.

When we proceed to the description of how the process models are represented by the various valve elements things get no better. A well is modelled with a linear relationship to the abstracted flow. What is the linear relationship? Headloss is linear with flow? The paper states that 'drawdown is linear to the abstracted flow.' Does this mean that water level (drawdown) decreases linearly with abstraction flow? There is no easy way of telling what is meant. The other process model descriptions are no better.

When the validation of the model is discussed we are given large, detailed, flowsheets of the hydraulic layout in EPAnet. This reproduces badly. It is not clear if the pump speeds in the wells were varied during validation, as well as calibration, to better match the measured flow values. The graph of validation accuracy reports a commendably low MAE of 3.6%; but by eye data match is poor. The other processes look to be a better fit, but with the sand filters having the calculated flow consistently greater than the measured flow.

The paper is effectively a discussion of how to use EPAnet to represent the hydraulics of water treatment processes, and is let down by an inadequate explanation of how that representation is to be achieved.

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