Optimal design of water networks involving multiple contaminants for global water operations

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ABSTRACT

This work presents the development of a systematic technique to target the minimum fresh water consumption and wastewater generation to achieve maximum water recovery (MWR) for systems involving multiple contaminants. A generic linear programing (LP) model has been developed based on water network superstructure to simultaneously set the targets and design the MWR network, for both mass transfer-based (MTB) and non-mass transfer-based (NMTB) problems (i.e. global water-using operations). This work also includes cases where fresh water concentrations for all contaminants are assumed to be either zero or non-zero. The proposed method is superior since it can guarantee a global optimal solution. Application of the methodology on three case studies shows significant water savings, illustrating the effectiveness of the proposed approach.

KEYWORDS:

Mathematical Modeling; Maximum Water Recovery; Multiple Contaminants; Optimization

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