

A simplified method to calculate the percentage of fresh effluents (PFE) in non-steady state reactors

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Abstract

Storage reservoirs are a key element in wastewater treatment trains for agricultural reuse; however, there is a need for further research on design criteria and operation rules for such reactors. The percentage of fresh effluents (PFE) is an important parameter for the design of perfectly-mixed reactors. PFE correlates better than mean residence time with the performance of the reactor. It allows for estimation of the removal of pollutants in non steady-state systems, such as seasonal wastewater storage reservoirs, and for forecasting the quality of the effluents released for irrigation. However, calculation of PFE is a difficult process requiring complex computer algorithms. A simplified analytical approach is developed to calculate the PFE for n days. The formulation is discussed, describing the relationships between the hydraulic variables, and then applied to a non-steady-state continuous-flow wastewater reservoir in Eastern Sicily (Italy).

Keywords: hydraulic age distribution, perfectly-mixed reactor, mean residence time, wastewater storage reservoirs