MATHEMATICAL MODELLING OF THE RIVER POLLUTION BY EMERGENT POLLUTANTS

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Modelling of process of river pollution by wastewaters is necessary for monitoring, planning and management of urban waters. It provides the way to estimate the influence of different products to use in households and industrial production and it contents in wastewaters and impact on aquatic environment.

Mathematical modelling of water pollution processes has widely used in deferent researches [1-3] and can be apply for different kinds of water pollu-tants. Most of developed models proposed for real water pollution conditions, local and significant complicated for practical implementation.

The proposed mathematical model is developed for alluvial rivers with laminar character of wastewaters and river water mixing and without high peaks of water flow velocity. The model bases on the classical hydrodynamic studies with combination of the mass balance approach and principles of hydrodynamics. The dynamic of the water pollution process characterizes by the differential equation of the first order [4]. The particular solution (as auto-model solution) of the differential equation can be written in the following form

$$C(t) = m\left(1 - \exp\left\{- V_1 t / V_2\right\}\right), \qquad (1)$$

with suggestion that the concentration of specific emergent pollutant in river water flow is extremely small compare to the concentration of it in wastewater and tends to zero. Where are $C(t)$ – the concentration of the emergent pollutant in the determined time period (t) in the river water flow after the wastewaters discharge; V_1 – the volume of the zone of mixing (in the research the volume of the mixing zone defined as sum of wastewater withdraw rate and water flow rate in m^3/s) and characterized by the river profile; V_2 – the volume of wastewater withdraw in m^3/s; m – the concentration of the emergent pollutant to come in the river with wastewaters, *mg/l.*

Reference

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