



Numerical simulation of dissolved oxygen, algal biomass, nitrate, organic nitrogen, ammonia, and dissolved phosphorus in waste stabilization ponds

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ABSTRACT

Nowadays, throughout the world industrial communities have caused enormous difficulties for the inhabitants by unsuitable way of using water, soil, and energy sources. Water as a source of life is being used in different sections of civil life and is essential for civilization. With most regret, this natural source is being vastly polluted by municipal, industrial and commercial waste. Thus, selecting suitable methods for wastewater treatment is very important. Unfortunately, these troubles are more common in the developing countries where they do not have enough financial supports for the wastewater treatment. The best option for these communities which are generally located in warm regions, is through the usage of waste stabilization ponds. Application of modeling techniques is a common way to avoid expensive and time-consuming experiments. In this research, an implicit scheme known as backward time backward central space (BTBCS) was used to solve the advection-diffusion equations along the sources and sinks to predict the critical conditions. Various concentrations in the maturation pond were simulated, namely, dissolved oxygen, organic nitrogen, ammonia, nitrate, algae, and phosphate. Results proved that the average accuracy of model outputs was more than 97%.

Keywords: Modeling; Simulation; Waste stabilization pond; Dissolved oxygen; Organic nitrogen; Ammonia; Nitrate; Algae; Phosphate

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