

Sahar Soleimani

Thesis

Numerical Simulation of Biological Clogging in Biofilters

Abstract

A two-dimensional unsaturated flow and transport model, which includes microbial growth and decay, has been developed to simulate biological clogging in unsaturated soils, namely biofilters. The bacterial growth and rate of solute reduction due to biodegradation is estimated using the Monod equation. The equations are coupled together and the effect of bioclogging is considered in the proposed conceptual models that relate the relative permeability term to the microbial growth. The model was used to evaluate the impact of different waste distribution approaches (continuous vs. pulse) on filter clogging and to study the effect of the kinetic parameters of the Monod equation on biomat formation. The model was also used to simulate the progressive clogging of a septic bed as a biomat initially forms at the up-gradient end of the distribution pipe, displacing wastewater infiltration and biomat formation further down-gradient over time.

Degree

M.A.Sc.

Completion

2007

Supervisors

Van Geel, Isgor