

Improved clogging and backwashing model for filtration of arsenic-contaminated water(Article)

- Imteaz, M.A.,
- Ahsan, A.,
- Kaur, P.
- [View Correspondence \(jump link\)](#)
- ^aDepartment of Civil and Construction Engineering, Swinburne University of Technology, Melbourne, Australia
- ^bDepartment of Civil Engineering, Uttara University, Dhaka, Bangladesh
- ^cDepartment of Separation Science, Lappeenranta-Lahti University of Technology, Mikkeli, Finland

Abstract

For many remote and under-privileged communities, water filtration is the first step of treatments before boiling and/or other higher level treatments. Clogging is a common unavoidable hindrance to such systems, which causes reduced efficiency with regard to the flow rate of filtered water. Backwashing is commonly used to recover the filtration capacity of clogged filter media. This paper presents an improvement of a previously developed simple clogging and backwashing efficiency model for the third-generation IHE family filter, which was developed by Unesco-IHE Institute for Water Education. The earlier simple model considered a linear decay of flow rate due to clogging in a weekly timestep. With the aim of enhancing the model's accuracy, this work considered three other models (a linear model with a daily timestep, a power function model and an exponential model). The performance of the models was assessed using the root mean squared error and chi-squared (χ^2) values derived from predicted and measured flow rates through the device during successive clogging and backwashing periods for up to 4 months. The improvements using the linear 1 day model over the linear 7 day model were insignificant. Among the tested models, the power function model provided the best predictions, with an average χ^2 improvement of 33% over the previously developed linear model. © 2020 ICE Publishing: All rights reserved.

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