بسم الله الرحمن الرحيم

شبكة المعلومـــــات الجامعية

التوثيق الالكتروني والميكروفيلم

شبكة المعلومات الجامعية

جامعة عين شمس

التوثيق الالكتروني والميكروفيلم

﴿ قـــسـم ﴾

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
علي هذه الأفلام قد اعدت دون آية تغيرات

يجب أن

تحفظ هذه الأفلام بعيداً عن الغبار

في درجة حرارة من 15 – 20 مئوية ورطوبة نسبية من 20-40 %

To be kept away from dust in dry cool place of
15 – 25c and relative humidity 20-40 %

بعض الوثائق الأصلية تالفة

بالرسالة صفحات

لم ترد بالأصـــل

CONTAMINANT TRANSPORT IN GROUNDWATER IN THE PRESENCE OF COLLOIDS AND BACTERIA

By

Mohamed Aly El Kordy

B.Sc. in Civil Eng., Cairo University 2004

A Thesis Submitted to the
Faculty of Engineering at Cairo University
in Partial Fulfillment of the
Requirements for the Degree of
MASTER OF SCIENCE
in
IRRIGATION AND HYDRAULICS

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ABSTRACT

Colloids and Bacteria (microorganisms) naturally exist in groundwater aquifers and can significantly impact contaminant migration rates. During the past decade, a significant effort has been devoted to studying separately either colloids- or bacteria-associated contaminant transport, but the combined effect of both colloids and bacteria has not been thoroughly explored. In addition, many of the previous studies are restricted to one-dimensional analysis. In the present study, a conceptual model is first developed to account for the different physiochemical and biological processes, reaction kinetics, and different transport mechanisms of the combined system (contaminant-colloids-bacteria). The mass balance equations are numerically solved for two-dimensional groundwater systems using a third-order, total variance-diminishing scheme (TVD) for the advection terms. The TVD scheme significantly reduces numerical dispersion. The model is tested against experimental data and the results are favorable. The model is used to investigate the effects of various reaction rates and parameter values on the transport of contaminant in the combined system. The model is also used to investigate the hypothesis of using colloids as retarding agents in a bioremediation process. The analysis shows that the contaminant transport is more sensitive to reaction rates that govern colloid transport than to those governing bacterial transport. It is also found that accounting for biological processes like bacterial growth and decay, bacterial chemotaxis, and bacterial lysing are essential for a successful bioremediation modeling. The model further illustrates that using colloids with a high affinity to the soil particles factor can help immobilize contaminant plumes and thereby can maximize the benefits of remediation efforts of groundwater contaminated aquifers.