



## Three-dimensional modeling of colloid and virus cotransport in porous media

Vasileios E. Katzourakis (1) and Constantinos V. Chrysikopoulos (2)

(1) Environmental Engineering Laboratory, Civil Engineering Department, University of Patras, Patras 26500, Greece  
(billiskatz@yahoo.gr), (2) School of Environmental Engineering, Technical University of Crete, Chania 73100, Greece  
(cvc@enveng.tuc.gr)

### Abstract

A three-dimensional mathematical model was developed to describe the simultaneous transport (cotransport) of viruses and colloids in water saturated, homogeneous porous media with uniform flow. The model accounts for the migration of individual virus and colloid particles as well as viruses attached onto colloids. Viruses can be suspended in the aqueous phase, attached onto suspended colloids and the solid matrix, and attached onto colloids previously attached on the solid matrix. Colloids can be suspended in the aqueous phase or attached on the solid matrix. Viruses in all four phases (suspended in the aqueous phase, attached onto suspended colloid particles, attached on the solid matrix, and attached onto colloids previously attached on the solid matrix) may undergo inactivation with different inactivation coefficients. The governing coupled partial differential equations were solved numerically using finite difference methods, which were implemented explicitly or implicitly so that both stability and speed factors were satisfied.