Modeling Particle Migration and Deposition in Porous Media by Parallel Pathways with Exchange

Faruk Civan and Vinh Nguyen

CONTENT:
Summary .................................................. 458
11.1 Introduction ........................................... 458
11.2 Improved Plugging–Nonplugging Parallel Pathways
   Model ..................................................... 460
   11.2.1 Plugging and Nonplugging Pathways with Exchange
          Model of Porous Media ......................... 460
   11.2.2 Porosity ........................................ 461
   11.2.3 Fractions of Porous Media Containing the Plugging and
          Nonplugging Pathways ......................... 461
   11.2.4 Permeability .................................... 462
   11.2.5 Volumetric Flux of the Particle-Carrier Fluid Suspension ........ 462
   11.2.6 Particle Deposition Kinetics .................. 463
   11.2.7 Particle Transport .............................. 466
   11.2.8 Average Particle Deposition and Overall Pressure
          Difference in a Core Plug ..................... 467
11.3 Numerical Solution .................................... 468
11.4 Experimental Validation ............................. 469
11.5 Discussion ........................................... 477
11.6 Conclusions .......................................... 479
11.7 Acknowledgment ...................................... 479
Nomenclature ............................................. 479
Appendix — Evaluation of Spatial Derivatives and Integrals ............ 481
References .............................................. 483
FIGURE 11.1
Realization of plugging and nonplugging parallel pathways with exchange for particle migration and deposition in porous media.