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The use of stochastic models in subsurface hydrology is growing at a logistic pace. To tie together a number of different stochastic methodologies for deriving subsurface transport equations, we have put together a brief review of some of the more common techniques. Our attention is confined to a few select methodologies so that we might delve in detail into assumptions required by the various approaches and their strengths and weaknesses. The methods reviewed include: Martingale, stochastic-convective, stochastic-relativistic, spectral-integral, perturbative, statistical-mechanical, and generalized hydrodynamics. Within this list, we also have included a few stochastic methodologies which have been used solely to develop expressions for the dispersion tensor.

MSC:
76S05 Flows in porous media; filtration; seepage
76R99 Diffusion and convection
60H15 Stochastic partial differential equations (aspects of stochastic analysis)
35R60 PDEs with randomness, stochastic partial differential equations
76M99 Basic methods in fluid mechanics

Keywords:
stochastic models in subsurface hydrology; subsurface transport equations; Martingale; stochastic-convective; stochastic-relativistic; spectral-integral; statistical-mechanical; dispersion tensor

Full Text: DOI

References:


