Parametric Dependence of the Advection-Diffusion Equation in Two Dimensions

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Abstract : In this work, we have solved the two-dimensional advection-diffusion equation numerically for a spatially dependent solute dispersion along non-uniform flow with a pulse type source in order to make a systematic study on the influence of medium heterogeneity, initial flow velocity, and initial dispersion coefficient parameters on the solutions of the equation. The behavior of the solutions is then investigated as we change the three parameters independently. Our results show that even though the parameters represent different physical features of the system, the effect on their variation is very similar. We also observe that the effects caused by the parameters on the concentration depend on the distance from the source. Finally, our numerical results are in good agreement with the exact solutions for all values of the parameters we used in our analysis.
Keywords : advection-diffusion equation, dispersion, numerical methods, pulse-type source
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