Comments

on the manuscript by J.-S.Chen and C.-W.Liu entitled *"Generalized analytical solution for advection-dispersion equation in finite spacial domain with arbitrary time-dependent inlet boundary condition"*.

The paper under consideration deals with mathematical modelling of one-dimensional transport equation supplemented with diffusion and decay terms. Both analytical and numerical approaches are presented. Comparison of analytical and numerical results is given for different examples of boundary inlet function in order to justify the approaches mutually. In addition, a short sensitivity analysis is presented with respect to solution dependence on diffusion and decay coefficients. The title and abstract provide a concise and clear information on aims, main ideas and results of the study.

The subject of the paper is extremely popular in mathematical, hydrologic and chemistry communities. As a result, it is absolutely impossible to give a full overview of related publications. Taking this into account, I can evaluate authors' overview in the introduction of the paper as sufficiently complete. It clear and properly indicates the original contribution of the presented study as well as its place among other numerous approaches in this area.

The main result of the paper is the analytical solution of the model equation which is obtained in closed-form formula (24) for arbitrary boundary inlet function $f(t)$. The formula is obtained by means of Laplace and Fourier transformation techniques with respect to time and space variables respectively. This method of solution is quite standard, and similar results for particular examples of inlet function and/or in the case of infinite range of spatial variable have been presented earlier. The latter fact is mentioned by the authors in the text in order to outline the new aspects of their work. It can happen that the presentation of the analytical solution of the problem under consideration coupled with numerical study and sensitivity analysis is an innovation either.

The closed-form formula for solution is deduced in the proper way, and the corresponding calculations are clear and sufficiently complete. So the main result of the study is rigorously justified. The developed approach can be used successfully at scientific laboratories for testing of numerical algorithms, in some engineering studies as well as in teaching process at universities.

The subject of the paper is within the scope of the journal Hydrology and Earth System Sciences (HESS), and the scientific level of the work is sufficient. To conclude, I recommend it for publication.

I've found some misprints and unlikely notations in the text but in almost all cases the other two referees have left me behind. I dislike notation $\bar{f}$ for Laplace transform of f in formula (13) because the bar stands below (in formulas 22) for Fourier transform whereas Laplace one is indicated by lower index L through the text. Besides the notation β_m is not explained in table 1. I suppose it stands for the eigenvalue of differential operator from equation (17) but those eigenvalues are denoted by Ψ_m in the remaining text of the paper.

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