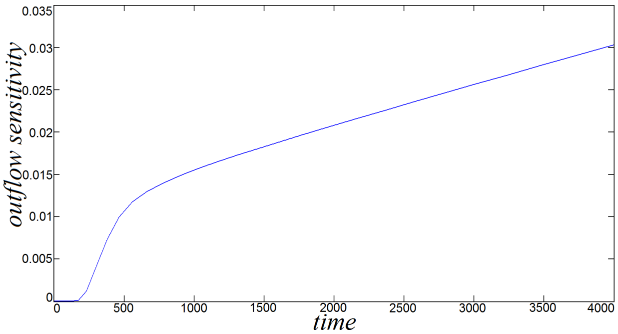

Figure 6: Sensitivity of concentration on dispersion coefficient

the iteration procedure in determination of $\alpha_{L,opt}$. The results are collected in Table 2. At each starting point we consider two different noise perturbations. Each perturbation randomly reaches the value up to one per mile of unite concentration at each time moment of measurements.

Table 2: Optimal values of α_L

start	α_L	α_L
0.5	1.013867	0.997070
1.5	0.993847	1.002343

6 Conclusion

- Numerical modeling of heat exchange arising in water infiltration in unsaturated porous media is discussed.
- Efficient numerical method is developed for heat transport in unsaturated porous media including the heat exchange with the matrix.
- An infiltration scenario is proposed to determine the heat transmission coefficient inside the porous media by solution of inverse problem.
- The developed method is efficient in solving inverse problems in determination of soil parameters, dispersion coefficients and transmission coefficient. Moreover, the suggested experiment scenario could be used also for determination of heat conduction parameter in the matrix.
- General external conditions are prescribed on the boundary.
- The efficiency of the numerical method is demonstrated by numerical experiments.

Acknowledgements: The authors confirm a support by the Slovak Research and Development Agency APVV-15-0681 and VEGA 1/0565/16.

References:

[1] J. Bear, A. H.-D. Cheng "Modeling Groundwater Flow and Contaminant Transport", Springer 2010, V.23 .

[2] D. Constales, J. Kačur: Determination of soil parameters via the solution of inverse problems in infiltration. Computational Geosciences 5 (2004), p. 25-46.

[3] J. Šimunek, M. Šejna, H. Saito, M. Sakai, M. Th. van Genuchten: The Hydrus-1D Software Package for Simulating the Movement of Water, Heat, and Multiple Solutes in Variably Saturated Media. 2013.

[4] J. Šimunek, J. R. Nimo: Estimating soil hydraulic parameters from transient flow experiments in a centrifuge using parameter optimization technique. Water Resour. Res. 41, W04015 (2005).

[5] M. A. Celia, Z. Bouloutas: A general mass-conservative numerical solution for the unsaturated flow equation. Water Resour. Res. 26 (1990), p. 1483-1496.

[6] J. Kačur, P. Mihala, M. Tóth: Determination of soil parameters under gravitation and centrifugal forces in 3D infiltration. Vseas transactions on heat and mass tranfer, Vol. 11, (2016), p. 115-120.

[7] D. Constales, J. Kačur, B. Malengier: A precise numerical scheme for contaminant transport in dual-well flow. Water Resources Research, vol. 39(10), (2003), ..- 1303,

[8] J. Kačur , J. Minár: A benchmark solution for infiltration and adsorption of polluted water into unsaturated-saturated porous media, Transport in porous media, vol. 97, (2013), p. 223-239.

[9] T. L. Bergman, A. S. Lavine, F. P. Incropera, D. P. Dewitt: Fundamentals of heat and mass transfer, John Wiley and Sons, 7th edition, (2011), ISBN 13 978-0470-50197-9.