EGU2020-1430
https://doi.org/10.5194/egusphere-egu2020-1430
EGU General Assembly 2020

A Two-Dimensional Analytical Solution for Remediation of Salt Affected Site through Ditch Drainage System

Shubham Tiwari and Brijesh Kumar Yadav
Indian Institute of Technology (IIT) Roorkee, Department of Hydrology, India (stiwari@hy.iitr.ac.in)

Agricultural fields are facing the problem of salinity, which is the key reason behind the decreased productivity of crop plants and reduced fertility of the soils. The ditch drainage system is extensively used for the elimination of salts present in agricultural fields. In this study, an analytical solution is developed for a ponded surface agricultural field with a fully penetrating ditch drainage system in presence of an additional sink in the study domain to improve the efficiency of saline water extraction. The considered study domain is taken of confined finite extent having homogenous and isotropic nature. The obtained analytical solution is compared well with a numerical model for a similar study domain. The analytical model is also validated for an existing analytical solution with no sink. Results show that the travel time of water molecules containing salt concentration reduced drastically due to the presence of sink in the middle of the porous domain. The path line of saline water started deviating from the original position represents that the sink has a strong impact on discharge from the side drains. Therefore, the efficiency of the ditch drainage system is increased significantly with the influence of sink in the flow domain. The proposed study is expected to help in the understanding of solute transport flow dynamics in the ditch drainage system with the influence of source/sink in real field conditions. The analytical solution may also be useful in testing and comparing the numerical codes generated for such types of flow scenarios in the subsurface.