

**The Effect of Stream-Aquifer Interactions On Groundwater Flow- An Analytical Approach**  
**Abstract n°2302**

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**KEYWORDS:** hyporheic zone, sloped stream boundary, stream-aquifer region, Visual MODFLOW

Stream-groundwater interaction has an important effect on water quality & control, water supply, and contaminant transport. Stream-aquifer interactions have been studied by many researchers in terms of different aspects but there are still issues that need to be clarified with further research studies. This research focuses on the effects of the stream-aquifer interactions on the groundwater head distribution. Water exchange between stream and aquifer is known as hyporheic flow. Hyporheic flow rate is typically determined by using Darcy's Law depending upon the stream head and groundwater head. The effect of the interaction is taken into account with an additional source sink term in the groundwater flow equation which is calculated by Darcy's Law. This research makes a contribution to the stream aquifer interaction studies by developing an analytical solution for the groundwater flow equation in which the hyporheic flow is considered by a source sink term. The 2-dimensional analytical solution is done for an unconfined, homogenous, and isotropic aquifer. The sloped stream boundary is used and the rest of the boundaries are assumed as no-flux boundary. A synthetic example is solved and the results are obtained for steady state conditions. A numerical model is developed by using Visual MODFLOW to verify the analytical solution results. Stream package of Visual MODFLOW is used to generate the considered problem conditions. The comparison of the analytical and numerical models results shows that the analytical solution performs well.

