

THE FUTURE OF ANALYTICAL SOLUTION METHODS FOR GROUNDWATER FLOW AND TRANSPORT SIMULATION

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Summary. The authors here posit that a renaissance of analytical and hybrid analytical-numerical solutions may be forthcoming. Despite the small number of researchers developing analytical solution approaches, techniques are steadily becoming more and more flexible and robust. Analytical modelling techniques, including convolution, transformations, analytic elements, and series solutions, are being used to augment, complement, or replace discrete models in order to solve specific and relevant problems ranging from carbon sequestration to surface water-groundwater interaction to reactive transport modelling. The authors here first ask and answer the essential question: “what is an analytical solution?”. This is followed with a presentation of multiple recent advances in analytical modelling approaches, some necessary ingredients for future success, and some reasons why we might want to see analytical and semi-analytical approaches succeed.