

# Surface-ground water interactions in numerical simulation: coupling strategies and techniques

Arefin Haque<sup>1</sup>, Amgad Salama<sup>1</sup>, Kei Lo<sup>2</sup>, Xinlei Guo<sup>3</sup>, and PENG WU<sup>1</sup>

<sup>1</sup>University of Regina

<sup>2</sup>Water Security Agency

<sup>3</sup>China Institute of Water Resources and Hydropower Research

May 5, 2020

## Abstract

Numerical simulation on groundwater is critical for water resources management. Much research has been conducted in the past using different techniques. Groundwater and surface water should not be treated as isolated components, but rather as interconnected constituents. The interaction between surface and ground water is complex and has never been fully understood. A clear understanding of fundamentals between surface and ground water is essential to conduct groundwater simulation. A comprehensive framework is needed to incorporate physical mechanisms with mathematical models for describing the surface-groundwater interactions. In the present review, up to date coupling strategies and techniques are summarized and compared. Detailed domain models and domain integrated models are reviewed respectively. The advantages and limitations of each technique, including fully coupled scheme and loosely coupled scheme, are presented. The available software using each coupling strategy are listed from previous research. The review will serve as a guidance for future numerical simulation on surface and groundwater interactions.

## Hosted file

Review on surface and groundwater interactions.docx available at <https://authorea.com/users/303267/articles/434862-surface-ground-water-interactions-in-numerical-simulation-coupling-strategies-and-techniques>