

## FloPy

*What is FloPy? How is it different from MODFLOW and how does it interact with MODFLOW? What are some advantages (easy) and disadvantages (harder) of using FloPy rather than building MODFLOW models manually?*

FloPy is a Python package for creating, running, and post-processing of MODFLOW-based models. The FloPy package contains a set of Python scripts that run the MODFLOW model. However, program must be located somewhere within the system path, or within the working directory so it can interact with FloPy. The advantage is that the input files are created automatically, and it FloPy can be designed to easily change few things that can completely change the grid resolution for model (Bakker, 2016).

## Subgrid heterogeneity

*Given that the distribution of  $K$  is always heterogeneous at the small scale, what does it mean to provide one  $K$  value per grid cell? What are the implications for the  $K$  values we use in models in general? How does this change if we are modeling with different spatial resolutions (i.e. grid cell sizes)?*

One  $K$  per cell means an average value of the hydraulic conductivity for a certain distance. In general, hydraulic conductivity is a measure of how easily water can pass through soil or rock: high values indicate permeable material through which water can pass easily; low values indicate that the material is less permeable. On a smaller scale means that the values should be more accurate which will provide more accurate model of a real subsurface units.

## Confined Models

*What does it mean for a groundwater model to be confined? How does this simplify calculations of groundwater flux? How do we specify this with cell types in MODFLOW?*

Confined groundwater model means that it is saturated with water. The groundwater flux in this case is calculated according to the Darcy's law. For confined cells in MODFLOW the flux remains constant throughout the simulation.

## Reference:

Bakker, Mark, Post, Vincent, Langevin, C. D., Hughes, J. D., White, J. T., Starn, J. J. and Fienen, M. N., 2016, Scripting MODFLOW Model Development Using Python and FloPy: Groundwater, v. 54, p. 733–739, doi:10.1111/gwat.12413.