

## FrozenWall example problem

The FrozenWall example problem is a two-dimensional (2D), saturated problem that simulates creation of a low-permeability “wall” of frozen groundwater to shield a portion of an aquifer from regional groundwater flow to avoid the spread of contaminants to a larger area. The problem setup is described in detail in the SUTRA 4.0.0 documentation:

Voss, C.I., Provost, A.M., McKenzie, J.M. and Kurylyk, B.L., 2024, SUTRA—A code for simulation of saturated-unsaturated, variable-density groundwater flow with solute or energy transport—Documentation of the version 4.0 enhancements—freeze-thaw capability, saturation and relative-permeability relations, spatially varying properties, and enhanced budget and velocity outputs: U.S. Geological Survey Techniques and Methods, book 6, chap. A63, 91 p., <https://doi.org/10.3133/tm6A63>.

### Input files

A complete set of input files for the example problem is provided:

- SUTRA.FIL – Contains file assignments for the remaining input and output files.
- FrozenWall.inp – Main input (INP) file.
- FrozenWall.inp8D – Contains INP dataset 8D (observations) and is referenced in the INP file using the “INSERT” command.
- FrozenWall.ics – Initial conditions (ICS) file.

### Output files

The output files generated by this example problem are listed below:

- FrozenWall.lst – Main output (LST) file.
- FrozenWall.nod – Nodewise results output (NOD) file.
- FrozenWall.ele – Elementwise results output (ELE) file.
- FrozenWall.rst – Restart output (RST) file.
- FrozenWall\_Timed\_Obs.obc – Observations output (OBC) file.
- FrozenWall.smy – Summary output (SMY) file.

### Execution

Before running the example problem, you may wish to save the existing output files for later comparison with your new results. To run the simulation, run the batch file “RUNSUTRA.BAT” (which calls the SUTRA executable in the “SUTRA\_4\_0/bin” subdirectory) in the folder (subdirectory) that contains the input files for this example.