



PLAXFLOW MODULE

Groundwater flow is an important issue in many engineering fields such as geotechnical, environmental and hydrological engineering. In order to take groundwater flow into account in geotechnical software applications, advanced models for the simulation of the unsaturated, time-dependent and anisotropic behaviour of soil are required.

While the PLAXIS 2D and 3D software by default includes options to perform steady state groundwater flow analysis, the PlaxFlow module enables users to perform time dependent groundwater analysis in a user-friendly and efficient manner. Fully coupled flow-deformation analyses can be performed, allowing simultaneous calculation of changes in pore pressures which may affect deformation and vice versa. The flow-only mode is available when users are only interested in groundwater flow. In this mode displacements and stresses are not included in the calculation.

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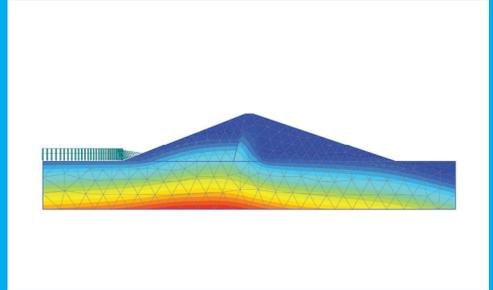
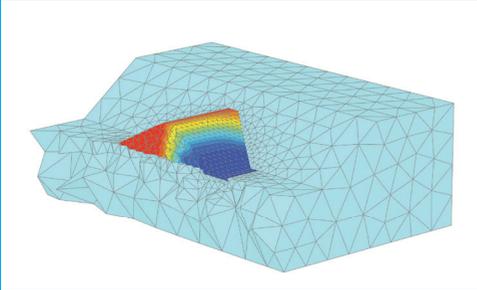
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Groundwater analysis in PLAXIS

With the PlaxFlow module users have extra options available in the software to take into account time dependent groundwater flow, unsaturated soils and interaction between flow, pore pressure and settlements.

PLAXIS offers various predefined properties to define the unsaturated soil behaviour, according to common soil classification system for example Hypes, USDA and Staring. Predefined data sets for the Van Genuchten and Approximate Van Genuchten model are available for all types of soil. For experts on groundwater flow modelling, all Van Genuchten model parameters can be entered manually, or user defined relationships between groundwater head, permeability and saturation can be entered.

In terms of flow boundary conditions users can assign time dependent variation of water levels or flux to model boundaries, or soil boundaries to simulate various complex hydrological conditions. The input of the time dependant properties are based on harmonic, linear, or table functions. Water levels can be assigned a time dependent component as well. This allows the modelling of seasonal variations of river water level behind embankments and their effect on the overall slope stability. Precipitation can be simulated, which translates to a vertical infiltration on the exposed ground surface. Wells and drains can be included in the model, allowing pumping tests or other hydrological applications to be modelled.

For the calculation additional options are available. The pore pressure calculation type is extended with a time dependent option in addition to the available steady state option. The Flow-only mode is available to ignore any deformation or stresses of the soil in all calculation phases, to purely focus on the groundwater aspects. The coupled flow-deformation calculation type allows users to calculate the complex interplay between changes in pore pressure, stress and deformation.

The PLAXIS Output program is extended with various new plot types to display contours and vectors of groundwater flow, pore pressures, saturation, suction and Darcy flux. For curves, options exist to visualise the development of groundwater head and pore pressures through various calculation phases providing valuable insight in the groundwater flow process.

Applications

- Simulations of unsaturated soil behaviour
- Earth and rockfill dams (time dependent problems)
- Excavation, mine dewatering
- Analysis of rapid drawdown situations
- Slope stability analysis, effect of rain and flooding
- Soils with collapse risks (compacted soils)
- Drainage systems
- Simulate pumping tests

Request a free demo

To learn more about PLAXIS and to download a free demo version, visit www.plaxis.com/demo.