

**Description**

**GGU-TRANSIENT**  
(Add. Module for GGU-SSFLOW2D)

Calculation of non-steady-state groundwater flow in horizontal, vertical and axis symmetrical groundwater systems using finite element method.

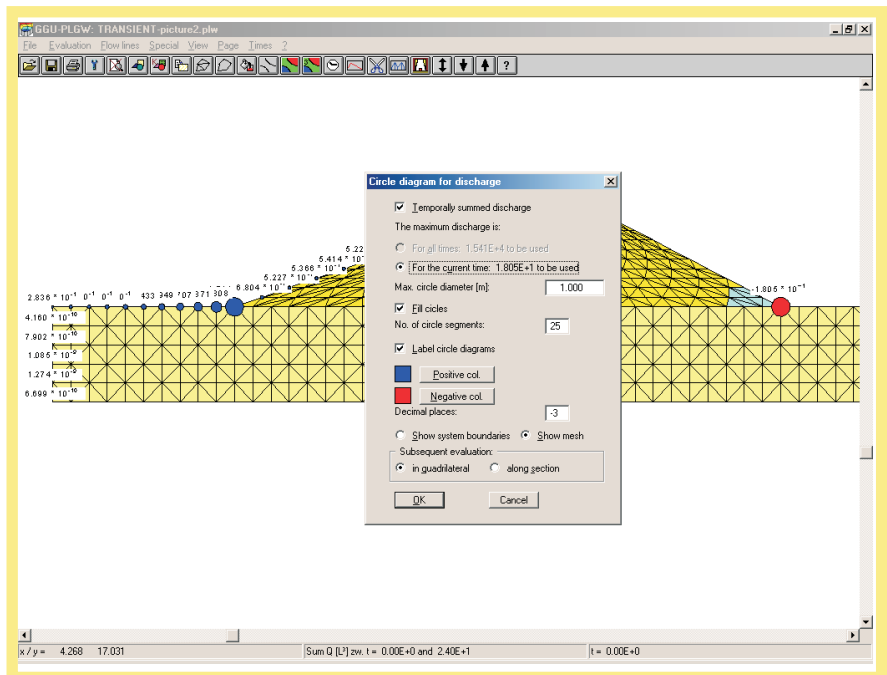
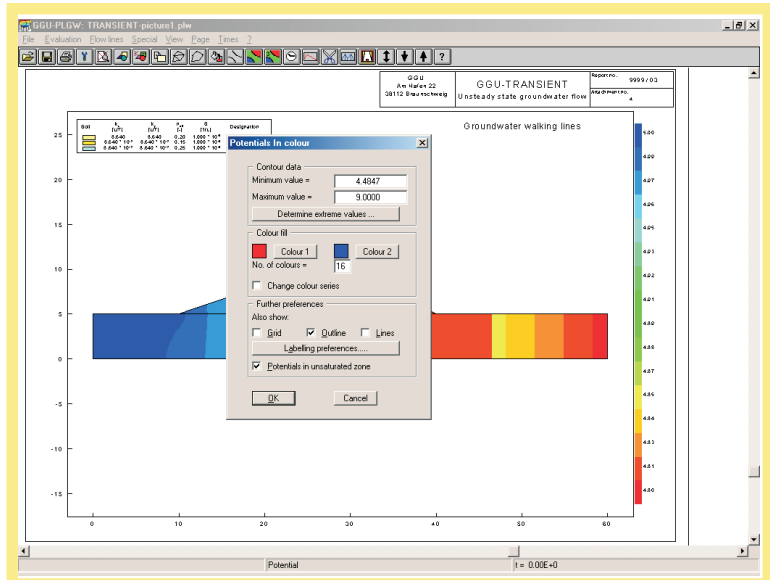
**Program Capabilities:**

- Consideration of seepage lines and the unsaturated zone
- Graphically oriented data input and change of time-dependent boundary conditions using polygons for potentials and flux
- Graphically oriented data input and change fixed boundary conditions using polygons for potentials and flux (single, line and area flux)
- Color supported presentation of potentials in cross-section
- Presentation of potentials as progress line for selected system nodes
- Time oriented presentation of velocities, flux, flow lines or potentials as normal, colored or 3-dimensional Iso-lines
- Animated screen presentation of potentials over time
- MiniCAD-System for additional labelling and illustration

For a transient calculation of groundwater flow, a stable initial condition is required. This initial condition is found by the program TRANSIENT from a file (e.g. PLGW.DA1) which is created from a previous analysis undertaken with the program GGU-SSFLOW2D. This data must be loaded as the first action after starting the program. In addition to the analysis results, the data file also contains the relevant soil and input parameters for the analysis.

These fundamental parameters (e.g.  $k$ ,  $n_{eff}$  etc.) cannot be modified in the TRANSIENT program. If they are altered, then the soil parameters will no longer match the potentials and flows, and the transient calculations will be meaningless.

Of course, for all groundwater flow problems (planar vertical, planar horizontal and axisymmetric), it is necessary to input parameters which are appropriate for a transient flow calculation.



In addition to soil parameters, time-dependent boundary conditions can be defined for the transient program. Time dependent boundary conditions (potential or flow) are entered as polynomial functions. These polynomial functions can be defined at single or multiple system nodes. These (transient) soil parameters and polynomials can be saved in a separate boundary data file, to be available for a subsequent calculation.

