

CODE_BRIGHT

COupled DEformation BRIne, Gas and Heat Transport

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Code_Bright/GiD: short description

The screenshot displays the GiD software interface for a project named 'escombrerabeta'. The main window shows a 3D model of a geological cross-section with various layers. A 'Problem data' dialog box is open, showing the 'General data' tab. A red arrow points from a red-bordered text box to the 'Updated lagrangian method' dropdown menu.

Problem data

General data | Equations solved | Solution strategy | Output

- Stress equilibrium (unknown displacement u)
- Updated lagrangian method: No
- Mass balance of water (unknown liquid pressure P_l)
Constant P_l [MPa]: 0.0
- Mass balance of air (unknown gas pressure P_g)
Constant P_g [MPa]: 0.0
- Energy balance (unknown temperature)
Constant Temp[C]: 20
- Mass balance of conservative species (unknown solute concentration w)

Buttons:

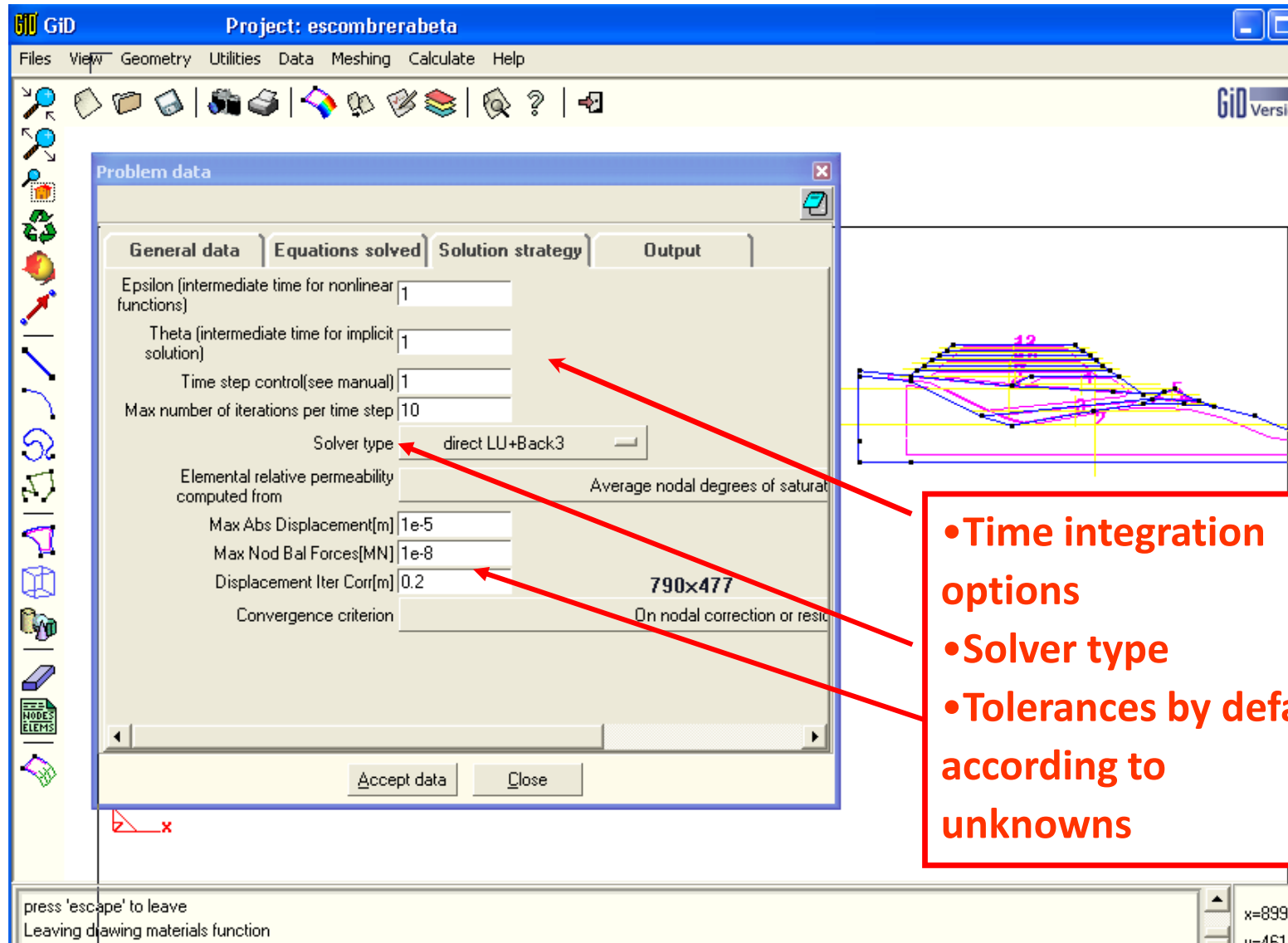
Choose equations to be solved

Legend:

- Natural
- LodosS
- Sa11S
- Sa12S
- Sa13S
- Sa14S
- Sa15S
- Sa16S
- Sa17P
- PresaS
- Sa10

Bottom status bar: Drawing 12 entities, press 'escape' to leave. Coordinates: x=899, y=461.

Code_Bright/GiD: general features



GiD Project: escombrerabeta

Files View Geometry Utilities Data Meshing Calculate Help

GiD Version 7

Materials

Natural

Mechanical data	Hydraulic and thermal data	Phase properties	Construction Excavation
Linear Elasticity	ITYCL P1	P2 P3 P4 P5 P6	P7 P8 P9 P10
Linear Elasticity - Temp and Suction	ITYCL P1	P2 P3 P4 P5 P6	
Nonlinear Elasticity	ITYCL P1	P2 P3 P4 P5 P6	
Viscoelasticity - Salt	ITYCL P1	P2 P3 P4 P5 P6	
Viscoplasticity - Salt	ITYCL P1	P2 P3 P4 P5 P6	
Viscoplasticity - Granular Material	ITYCL P1	P2 P3 P4 P5 P6	P7 P8 P9 P10
Viscoplasticity - General Parameters 1	ITYCL P1		P9 P10
Viscoplasticity - General Parameters 2	ITYCL P1		P9 P10
Viscoplasticity - General Parameters 3	ITYCL P1		P9 P10
TEP - Elastic Parameters	ITYCL P1	P2 P3 P4 P5 P6	P7 P8 P9 P10
TEP - Thermal Parameters	ITYCL P1	P2 P3 P4 P5 P6	P7 P8 P9 P10
TEP - Plastic Parameters 1	ITYCL P1	P2 P3 P4 P5 P6	
TEP - Plastic Parameters 2	ITYCL P1	P2 P3 P4 P5 P6	
TEP - Parameters Shape Yield Surf.	ITYCL P1	P2 P3 P4 P5 P6	P7 P8 P9 P10
TEP - Parameters Shape Plastic Pot.	ITYCL P1	P2 P3 P4 P5 P6	
TEP - Integration Control Parameters	ITYCL P1	P2 P3 P4 P5 P6	
Argillite - Elastic			P7 P8 P9 P10
Argillite - Coupling			
Argillite - Yield vo			
Argillite - Yield dev			

Assign Draw Unassign Import/E

• Construction/
excavation

• Hydraulic and thermal

• Mechanical models
• 1 or more lines per law
• Requires reference manual

$$\frac{d\varepsilon_{P7}^{P7}}{dt} = \Gamma \langle \phi(F) \rangle \frac{\partial G}{\partial \sigma'} \quad \phi(F) = \left(\frac{F}{F_o} \right)^N$$

$$F(J_1, J_{2D}, J_{3D}, s) = a J_{2D} \mu^2 F_b F_s$$

$$F_b = [-(J_1^o(s) + k_2 s + k_4)^{2-n} (J_1 + k_1 s + k_4)^n + (J_1^o + k_1 s + k_4)^2 - k_3 s J_1^o(s)] \gamma^o$$

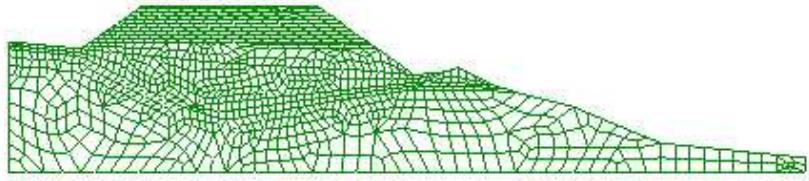
$$J_1^o(s) = 3p^c \left(\frac{J_1^{0*}}{3p^c} \right)^{\frac{\lambda(0)-\kappa}{\lambda(s)-\kappa}} \quad p_o(s) = J_1^o(s)/3$$

$$\lambda(s) = \lambda(0) [(1-r) \exp(-\beta s) + r]$$

GiD Project: escombrerabeta

Files View Geometry Utilities Data Meshing Calculate Help

GiD Version 7



Materials

Natural

Mechanical data	Hydraulic and thermal data				Phase properties		Construction Excavation					
	ITYCL	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	
Retention Curve	ITYCL	P1	P2									↓
Intrinsic Permeability	ITYCL	P1	P2									↓
Liquid Phase Relative Permeability	ITYCL	P1	P2									↓
Gas Phase Relative Permeability	ITYCL	P1	P2									↓
Diffusive Flux of Vapour	ITYCL	P1	P2									↓
Diffusive Flux of Dissolved	ITYCL	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	↓
Dispersive Flux of Mass and Energy	ITYCL	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	↓
Conductive Flux of Heat	ITYCL	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	↓
Conductive Flux of Heat 2	ITYCL	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	↓

Using interval Saving back

Command:

Assign Draw Unassign Import/Export

•Hydraulic and thermal material properties

ITYCL=1: $\lambda_{dry} = \lambda_{solid}^{(1-\phi)} \lambda_{gas}^{\phi}$ $\lambda_{sat} = \lambda_{solid}^{(1-\phi)} \lambda_{liq}^{\phi}$

ITYCL=2: $\lambda = \lambda_{sat} s_l \lambda_{dry}^{(1-s_l)}$

GiD Version 7

Project: escombrerabeta

Files View Geometry Utilities Data Meshing Calculate Help

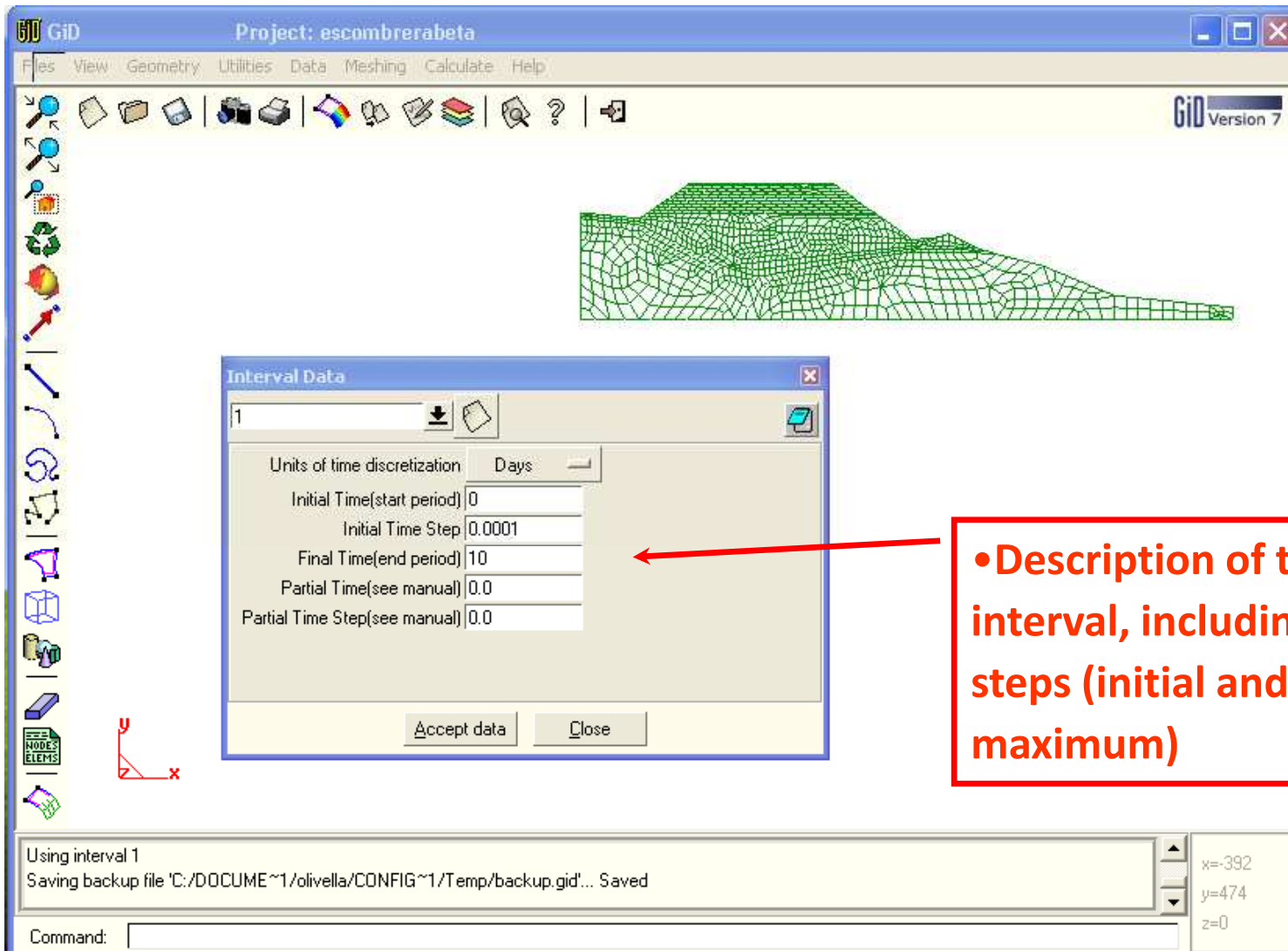
Materials

5

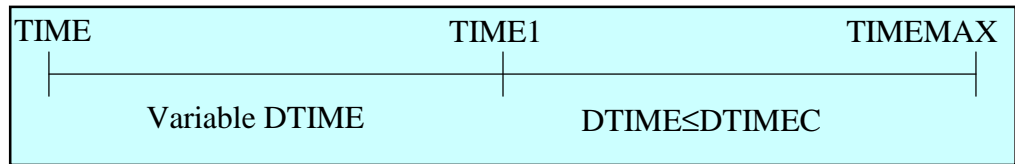
	Mechanical data	Hydraulic and thermal data			Phase properties			Construction Excavation			
Construction Or Excavation	1	-1	0	0	0	0	0	0	0	0	0
	1	-1	0	0	0	0	0	0	0	0	0
	1	-1	0	0	0	0	0	0	0	0	0
	1	-1	0	0	0	0	0	0	0	0	0
	1	-1	0	0	0	0	0	0	0	0	0
	1	+1	0	0	0	0	0	0	0	0	0

Design Draw Unassign Import/Export

• Construction/ excavation: material appears at a given time interval



•Description of time interval, including time steps (initial and maximum)



Project: escombrerabeta

Files View Geometry Utilities Data Meshing Calculate Help

•Parameters for hydraulic/thermal boundary conditions

•Can be applied to point or line or surface

Conditions

Flux B.C.

	Flow rate	Boundary flow rate
Prescribed vapor mass fraction(kg/kg)	0.0	
Prescribed gas flow(kg/s)	0.0	
Prescribed gas flow increment(kg/s)	0.0	
Prescribed gas pressure(MPa)	0.0	
Prescribed gas pressure increment(MPa)	0.0	
Gamma for gas	0.0	
Beta for gas	0.0	
Prescribed gas density(kg/m ³)	0.0	
Prescribed solute mass fraction(kg/kg)	0.0	
Prescribed air mass fraction(kg/kg)	0.0	
Prescribed liquid flow(kg/s)	0.0	
Prescribed liquid flow increment(kg/s)	0.0	
Prescribed liquid pressure(MPa)	0.0	
Prescribed liquid pressure increment(MPa)	0.0	
Gamma for liquid	0.0	
Beta for liquid	0.0	
Prescribed liquid density(kg/m ³)	0.0	
Prescribed heat flow(J/s)	0.0	
Prescribed heat flow increment(J/s)	0.0	
Prescribed temperature(°C)	0.0	
Smoothing parameter	0.0	

•Parameters for hydraulic/thermal boundary conditions

$$j_g^w = (\omega_g^w)^0 j_g^0 + (\omega_g^w)^0 \gamma_g (P_g^0 - P_g) + \beta_g \left((\rho_g \omega_g^w)^0 - (\rho_g \omega_g^w) \right)$$

Pick LEFTMOUSE to displace view (ESC to quit) (if present, mouse wheel zooms)
Pick LEFTMOUSE to displace view (ESC to quit).

Command:

Assign Entities Draw Unassign

Close

GiD Version 7

Project: escombrerabeta

Files View Geometry Utilities Data Meshing Calculate Help

Initial unknowns

Distribution	Constant
Ux -m-	0
Uy -m-	0
Uz -m-	0
Pi -MPa-	0
Pg -MPa-	0
T -°C-	0
Concentration -kg/kg-	0

Assign Entities Draw Unassign

Close

press 'escape' to leave
Leaving drawing materials function

Command:

Initial unknowns (constant or linear)

Other windows for:

- Initial porosity
- Initial stresses and history variables