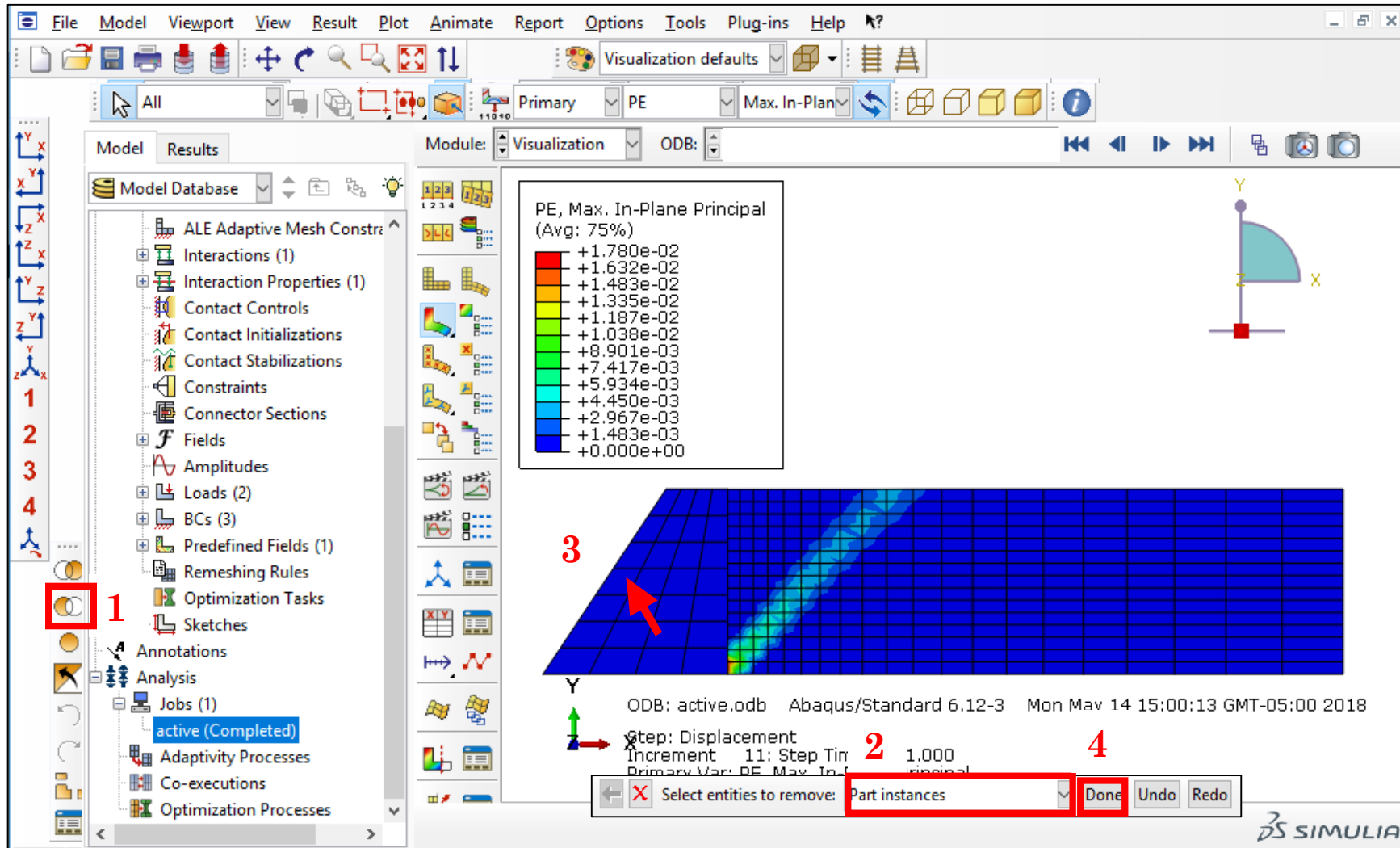


Results: Active failure



Results: Active failure

The screenshot displays the Abaqus software interface. The 'Tools' menu is open, with 'Path' and 'Create...' highlighted. The 'Create Path' dialog box is also open, with 'Continue...' highlighted. The main window shows a 2D plot of a failure path on a mesh, with a color scale for 'PE, Max. In-P' ranging from 0.000e to 1.780e. The 'Model Database' tree on the left shows the 'active (Completed)' job. The 'Create Path' dialog box has the following details:

- Name: Path-1
- Type: Node list, Point list, Edge list, Circular
- Buttons: Continue..., Cancel, Tip...

At the bottom of the main window, the following information is displayed:

ODB: active.odb Abaqus/Standard 6.11
Step: Displacement
Increment 11: Step Time = 1.000
Primary Var: PE, Max. In-Plane Principal
Deformed Var: U Deformation Scale Factor: +1.000e+00

1- Click on **Tools**,
Path and **Create**

2- Click on **Continue**

Results: Active failure

1- Click on **Add Before**

2- Select the nodes to be inserted into the path

3- Click on **Done**

4- Click on **OK**

Part Instance	Node Labels (Examples: 5 5:10 5:10:2)
1	SOIL-1

port selections: **Add Before..** Add After..

OK Tip Cancel

Start: 21
End: 336

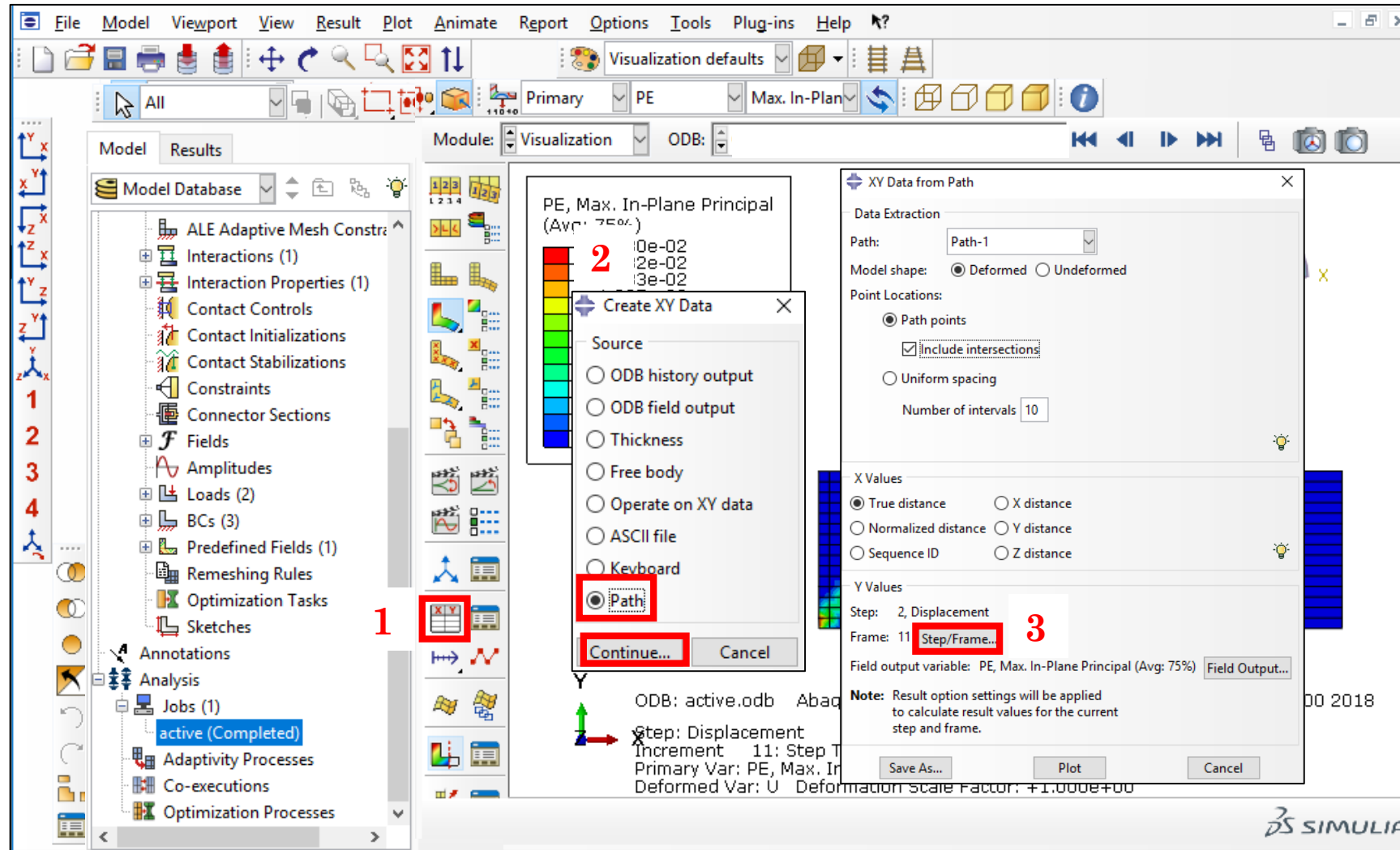
ODB: active.odb Abaqus/Standard 6.12-3 Mon May 14 15:00:13 GMT-05:00 2018
Step: Displacement
Increment 11: Step Time = 1.000
Primary Var: PE, Max. In-Plane Principa

Select nodes to be inserted into the path **Done** 1.000e+00

SIMULIA

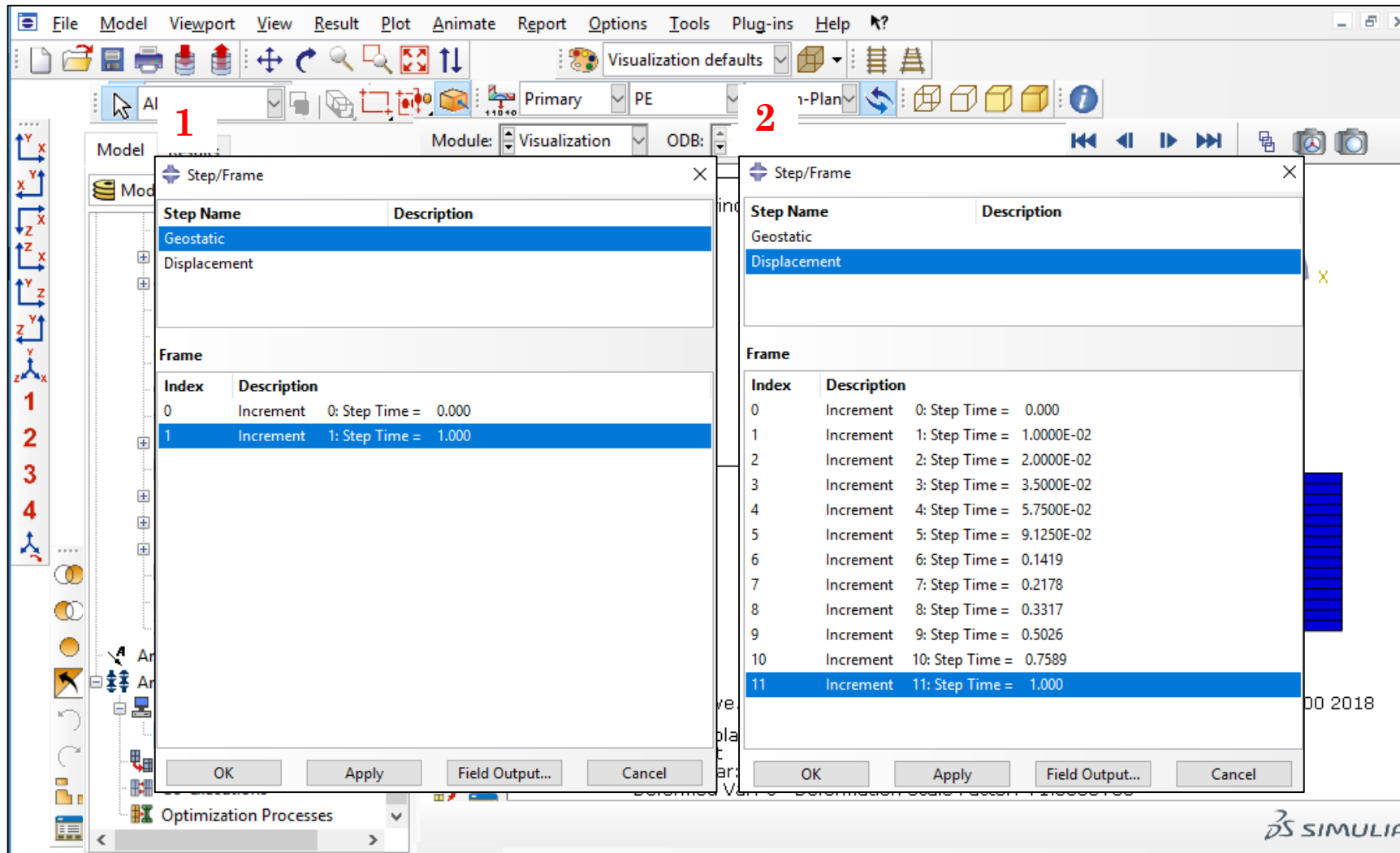
- 1- Click on **Add Before**
- 2- Select the nodes to be inserted into the path
- 3- Click on **Done**
- 4- Click on **OK**

Results: Active failure



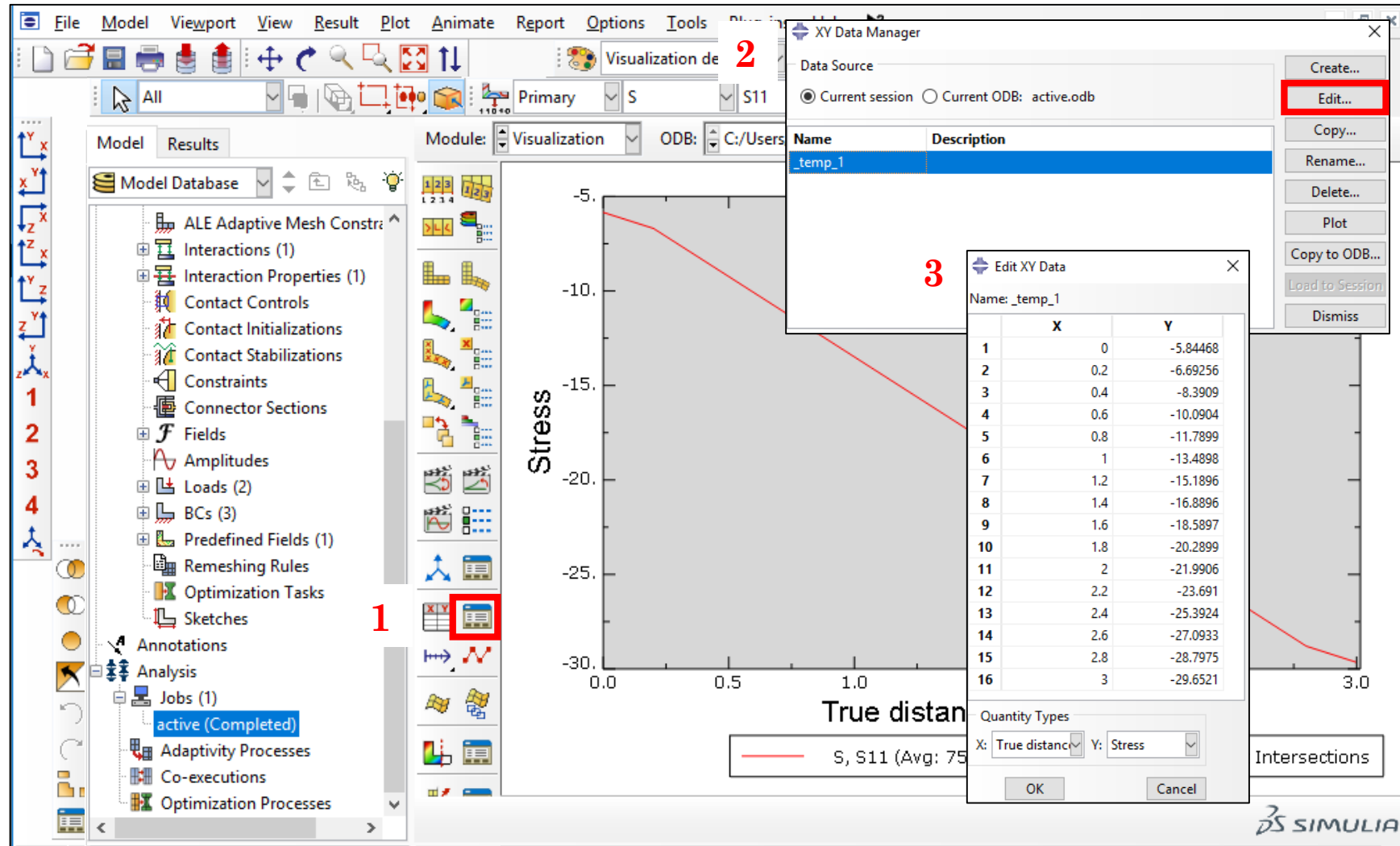
- 1- Click on the **Create XY Data** tool
- 2- Select **Path** and click on **Continue**
- 3- Click on **Step/Frame**

Results: Active failure



- 1- Set this configuration to evaluate the at-rest lateral earth pressure
- 2- Set this configuration to evaluate the active lateral earth pressure
- 3- Click on **OK**

Results: Active failure



1- Click on the **XY Data Manager** tool

2- Select ‘_temp_1’ and click on **Edit**

3- **Results**

Comparison – Coulomb theory

Soil parameters		
ϕ' [°]		30
c' [kPa]		0
γ' [kN/m ³]		17

Coulomb theory angles		
δ [°]		20
α [°]		0
β [°]		90

ϕ' [rad]		0.52
δ [rad]		0.35
α [rad]		0.00
β [rad]		1.57

ABAQUS results

Case:	at-rest	Case:	active failure
Depth [m]	S11 [kPa]	Depth [m]	S11 [kPa]
0.0	-5.8	0.0	-3.6
0.2	-6.7	0.2	-4.0
0.4	-8.4	0.4	-4.9
0.6	-10.1	0.6	-6.0
0.8	-11.8	0.8	-7.3
1.0	-13.5	1.0	-8.4
1.2	-15.2	1.2	-9.6
1.4	-16.9	1.4	-10.8
1.6	-18.6	1.6	-12.3
1.8	-20.3	1.8	-13.7
2.0	-22.0	2.0	-14.7
2.2	-23.7	2.2	-15.1
2.4	-25.4	2.4	-14.6
2.6	-27.1	2.6	-12.6
2.8	-28.8	2.8	-12.0
3.0	-29.7	3.0	-18.0

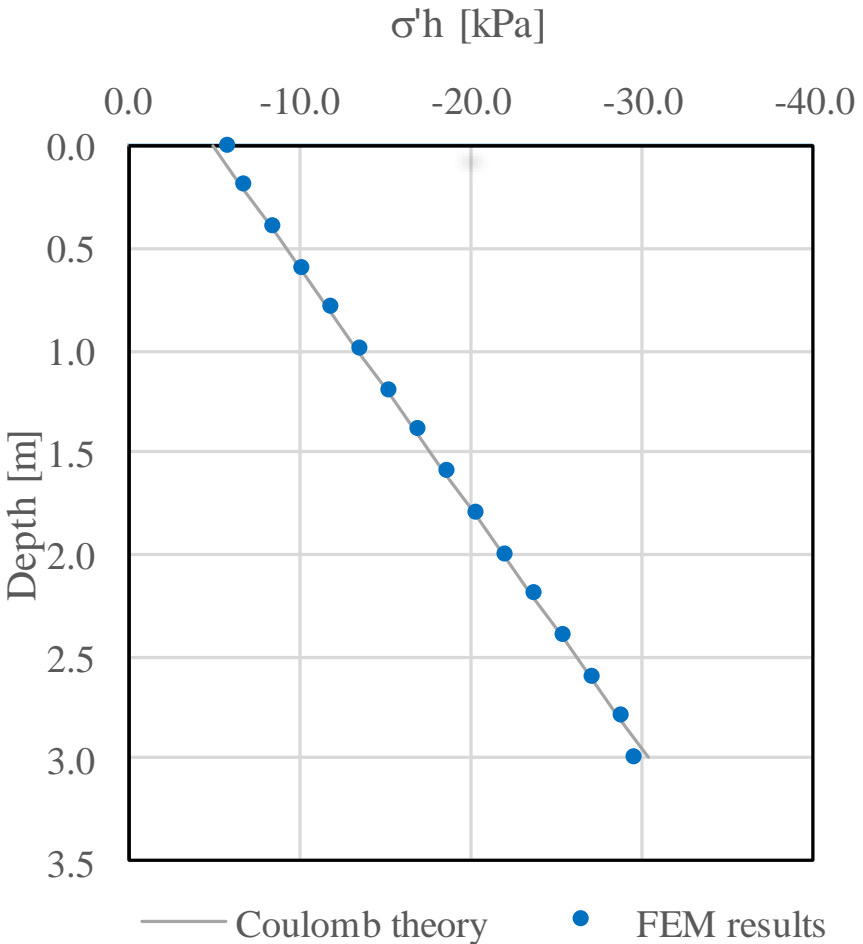
Theoretical result - Coulomb theory

$$K_0 = \frac{1 - \sin(\phi')}{1 + \sin(\phi')} = 0.5$$

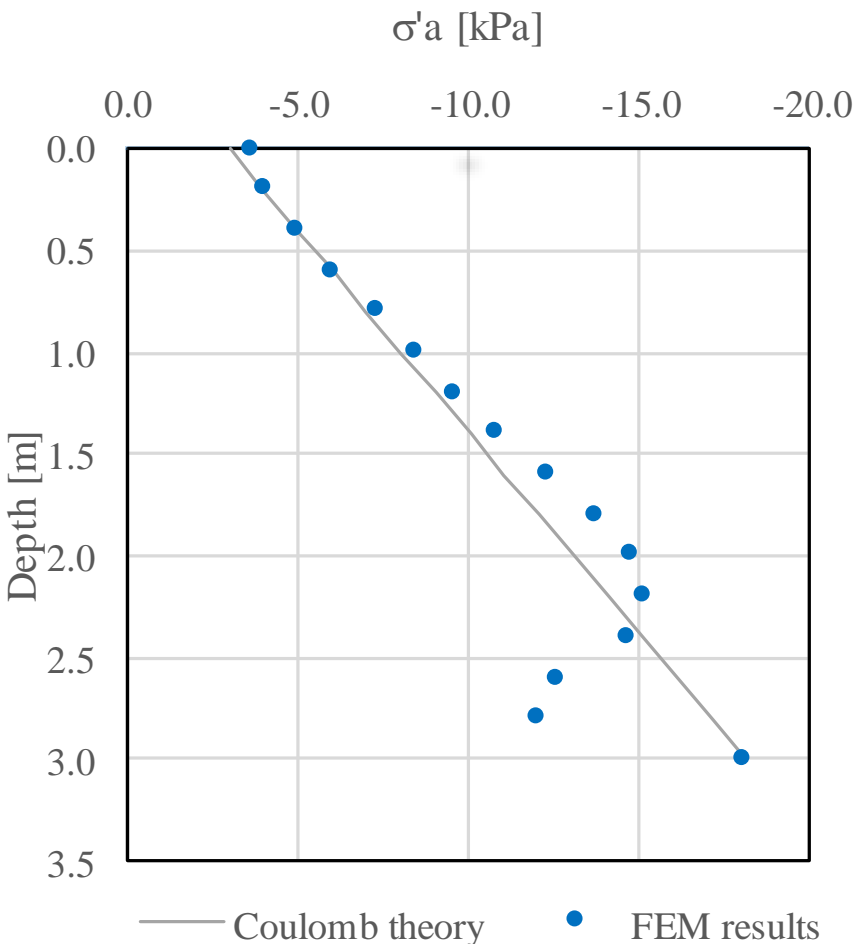
$$K_a = \frac{\sin^2(\beta + \phi')}{\sin^2(\beta) \sin(\beta - \delta) \left[1 + \sqrt{\frac{\sin(\phi' + \delta) \sin(\phi' - \alpha)}{\sin(\beta - \delta) \sin(\alpha + \beta)}} \right]^2} = 0.297$$

Depth [m]	σ'_{v_o} [kPa]	$\Delta\sigma'_v$ [kPa]	σ'_v [kPa]	σ'_h [kPa]	σ'_a [kPa]
0.00	0.0	-10	-10.0	-5.0	-3.0
0.20	-3.4	-10	-13.4	-6.7	-4.0
0.40	-6.8	-10	-16.8	-8.4	-5.0
0.60	-10.2	-10	-20.2	-10.1	-6.0
0.80	-13.6	-10	-23.6	-11.8	-7.0
1.00	-17.0	-10	-27.0	-13.5	-8.0
1.20	-20.4	-10	-30.4	-15.2	-9.0
1.40	-23.8	-10	-33.8	-16.9	-10.0
1.60	-27.2	-10	-37.2	-18.6	-11.1
1.80	-30.6	-10	-40.6	-20.3	-12.1
2.00	-34.0	-10	-44.0	-22.0	-13.1
2.20	-37.4	-10	-47.4	-23.7	-14.1
2.40	-40.8	-10	-50.8	-25.4	-15.1
2.60	-44.2	-10	-54.2	-27.1	-16.1
2.80	-47.6	-10	-57.6	-28.8	-17.1
3.00	-51.0	-10	-61.0	-30.5	-18.1

Comparison – Coulomb theory



at- rest lateral earth pressure



active lateral earth pressure