

# Strip Footing on Surface of Purely Cohesive Material

## Keywords

2D, Plane Strain, Modified Mohr-Coulomb model, arclength.

## Problem Description

This example deals with an evenly distributed load on a cohesive elastoplastic material to determine the bearing capacity.

## Discretisation

The problem is modelled using quadrilateral strain elements, QPN8. The model is totally restrained from moving in the x and y direction. The finite element mesh can be found in Figure 1.

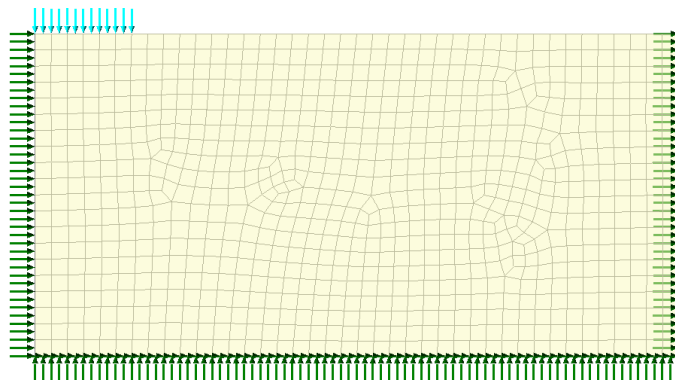


Figure 1: Finite element mesh showing supports.

## Material Properties

The soil is modelled by means of Modified Mohr-Coulomb model. Table 1 gives the material properties for this example.

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**Table 1: material properties**

Mass Density	Young's modulus, E	Poisson's ratio, $\nu$	Angle of friction, $\varphi$	Cohesion, c
2.7 t/m <sup>3</sup>	250.0E3 kPa	0.2	0°	100 kPa

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## Loading Conditions

The applied load is gradually increased using arclength until failure occurs.

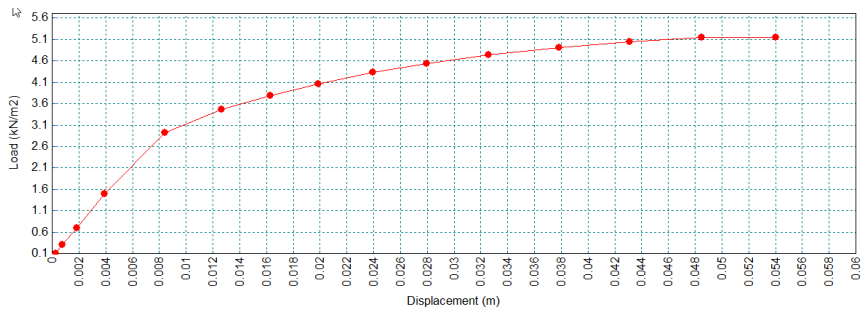
## Theory

The collapse load is given by the following equation, after Terzaghi & Peck [1].

$$q = (2 + \pi)c \quad (1)$$

## Comparison

The analytical collapse load is 514.16 kPa calculated using equation 1, which is identical to the 515.5 kPa obtained by LUSAS. Figure 2 depicts a plot of applied load versus displacement. We can see how the curve transforms into a plateau at the critical value. Some more findings can be seen on figures 3 and 4.



**Figure 2: Displacement versus applied load**

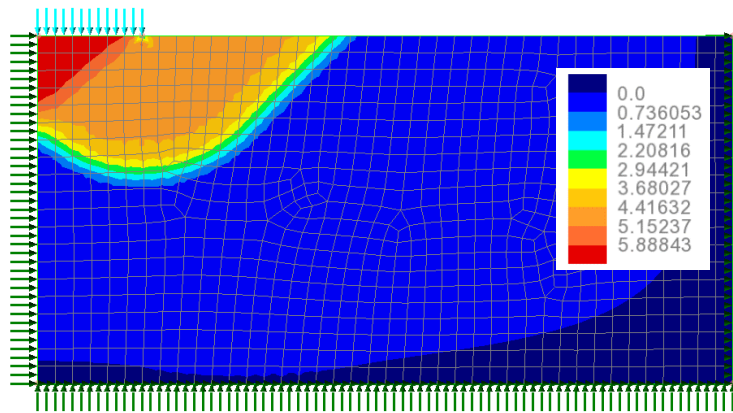


Figure 3: Displacement contours at failure (m)

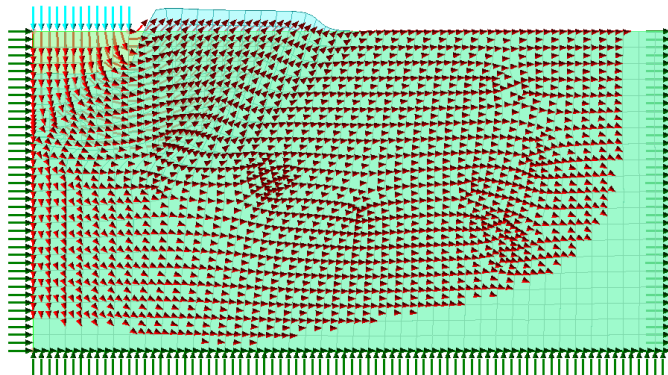


Figure 4: Vector displacement

## References

- [1] K. Terzaghi and R. B. Peck, Soil Mechanics in Engineering Practice, 2nd Ed. New York, John Wiley & Sons, 1967.

## Input Data

Strip Footing.mdl

