Pile test with loading frame
FE analyses

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with the collaboration of De Cérenville Géotechnique SA
Contents

• Pile test geometry and meshes

• 2D axisymmetric analysis

• 3D analysis with loading frame

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Hypotheses

- 2 different models

- a) 2D axisymmetric model, load control

- b) 3D model (1/4 due to symmetry), with an explicit model of loading frame

- Goal of model: prediction of

  - load settlement curve (3 soil data sets: optimistic, realistic, pessimistic)

  - plastic zones evolution during loading
<table>
<thead>
<tr>
<th>Modèle</th>
<th>Epess MPa</th>
<th>Emoyen MPa</th>
<th>Eopt MPa</th>
<th>$\gamma$ kN/m$^3$</th>
<th>$c$ kN/m$^2$</th>
<th>$\phi$ °</th>
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<tbody>
<tr>
<td>Dépôts d'inondation</td>
<td>Mohr-Coulomb</td>
<td>2</td>
<td>3.5</td>
<td>5</td>
<td>20</td>
<td>5</td>
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<td>Dépôts fluviatiles</td>
<td>Mohr-Coulomb</td>
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<td>50</td>
<td>75</td>
<td>21</td>
<td>1</td>
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<td>Dépôts lacustres</td>
<td>Mohr-Coulomb</td>
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<td>37.5</td>
<td>50</td>
<td>19</td>
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<td>Mohr-Coulomb</td>
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<td></td>
<td>pas dans le modèle de base</td>
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<tr>
<td>Béton</td>
<td>Elastique</td>
<td>20000</td>
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</table>

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Water -3 m
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Stress level for $F = 0 \, \text{kN}$

Stress level $= 1 \leftrightarrow$ plastique

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Stress level for \( F = 1000 \) kN

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Stress level for $F = 2'000$ kN
Stress level for $F = 3'000$ kN

Stress level $= 1 \Leftrightarrow$ plastique

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Stress level for $F = 4'000$ kN

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Stress level for $F = 5'000 \text{ kN}$

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Stress level for $F = 6000$ kN

Stress level = 1 $\Leftrightarrow$ plastic along the whole pile

Stress level = 1 $\Leftrightarrow$ plastique
Stress level for $F = 7'000$ kN

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Stress level for $F = 8'000$ kN
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25 years ZSOIL.PC
August 2010, Lausanne

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Pile test with loading frame: FE analyses
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Stress level and deformed mesh for F = 0 kN
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Stress level and deformed mesh for $F = 1'000$ kN
Stress level and deformed mesh for $F = 2'000$ kN
Stress level and deformed mesh for $F = 3'000$ kN
Stress level and deformed mesh for $F = 4'000$ kN

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Stress level and deformed mesh for $F = 5'000$ kN
Stress level and deformed mesh for $F = 6'000$ kN
Stress level and deformed mesh for $F = 7'000$ kN
Stress level and deformed mesh for $F = 8'000$ kN
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SL = 1 along the whole test pile
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Issues

- disp. controlled test => TOL !!

- model **without** contact elements!