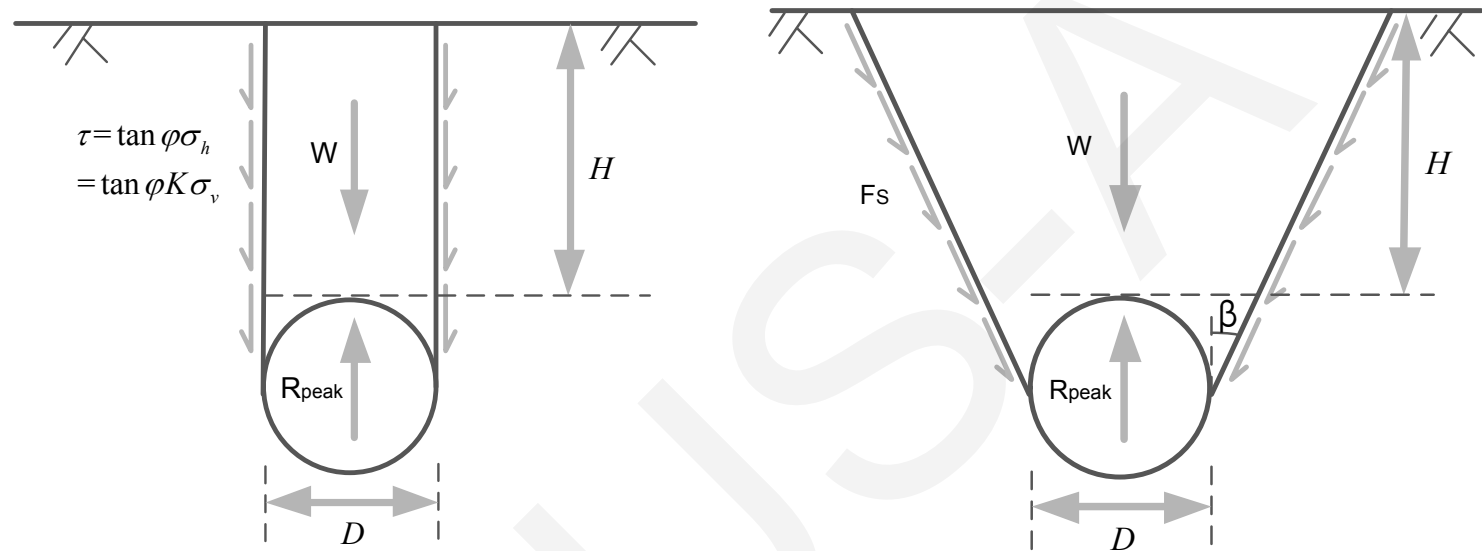


Analytical solution for upheaval buckling of shallow buried pipelines in inclined cohesionless soil

Key words: shallow buried pipe; upheaval buckling; inclined ground; analytical formulation; soil deformation mechanism

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Slip-surface mode of pipeline uplift failure in horizontal field



□ Deficiencies of the existing failure modes:

- Without considering the site inclination, the applicability to the inclined site is unknown
- Always assuming the stress state of soil on the fracture surface in K_0 state
- The slip-surface angle β is based on the empirical method

Results and conclusions

- ❑ The inclination of failure plan angles are not the same for the inclined ground condition. The two failure plans rotate in the downhill direction. The area of soil bounded by two slip surfaces for the inclined ground condition is larger than that in the horizontal ground.
- ❑ The magnitude of rotation increases with the increasing ground inclination θ for a given embedment ratio H/D , and decreases with the increasing H/D for a given θ . When H/D is larger than 4, the influence of ground slope is negligible.
- ❑ The peak uplift resistance reduces in the inclined ground, especially when H/D is less than 1. The relevant design codes do not consider the impact of ground inclination on the uplift resistance, resulting in a decrease in the factor of safety.