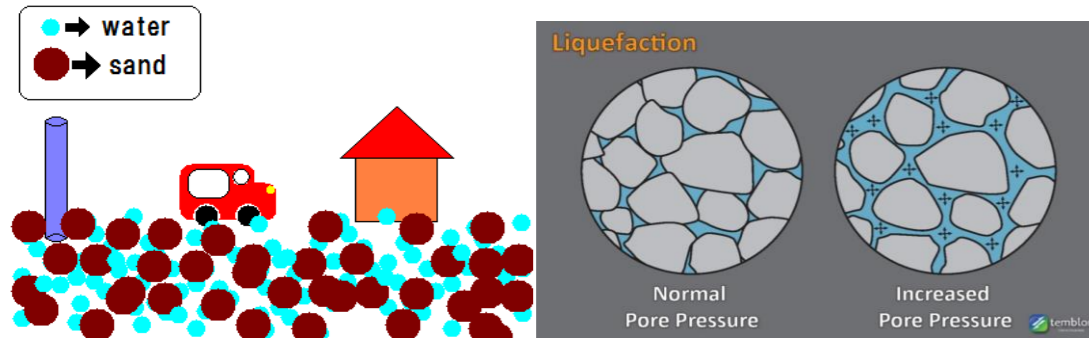


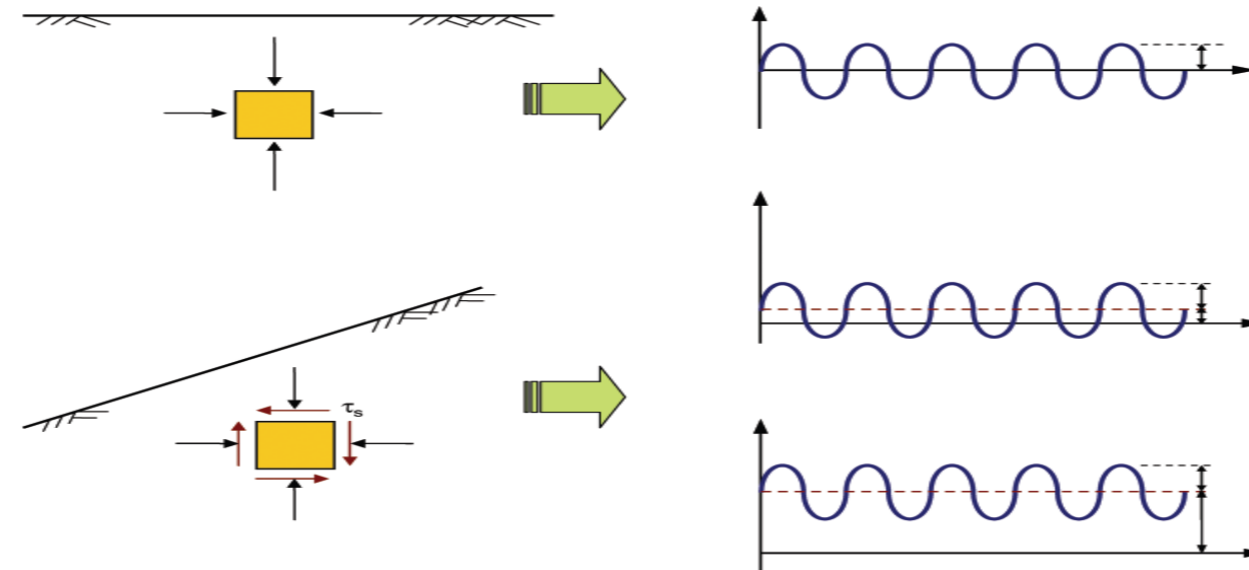
Introduction : Liquefaction

Seed and Lee (1966) suggested initial liquefaction in the isotropically consolidated specimens when r_u (pore pressure ratio) reaches unity where effective stress becomes zero.

$$r_u = \frac{\Delta U}{\sigma'_{3c}} \quad (u = \text{Pore Pressure})$$



Initial shear stresses



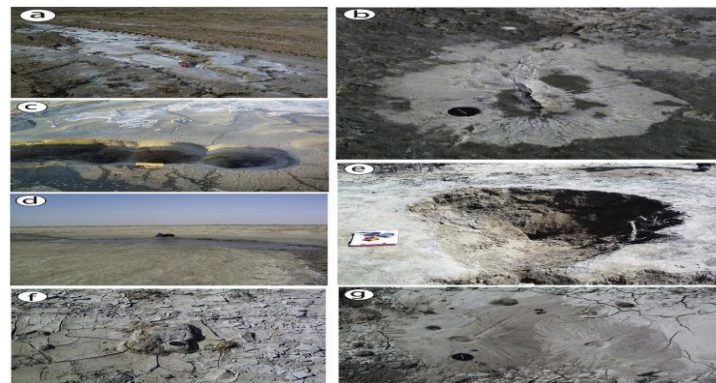
Cyclic loading conditions in the laboratory to simulate level ground and sloping ground conditions: (a) symmetrical loading; (b) non-symmetrical loading with stress reversal; (c) non-symmetrical loading without stress reversal (Yang and Sze 2011)

Stages of the current study

1. Prepare a stratified specimen using sand and silt
Height 140 mm and Diameter 70 mm
2. Apply CO₂, complete the saturation process using the combination of confining, back and pore pressures.
Consolidate the specimen
3. Apply the initial static stress of 20 kPa then reconsolidate to make effective confining pressure as 100 kPa.
Apply desired cyclic deviator stress of 32.5 kPa at 1 Hz frequency

(Type of stratification used in the testing, Dark areas : Silt, Light areas : Sand)

Free field liquefaction



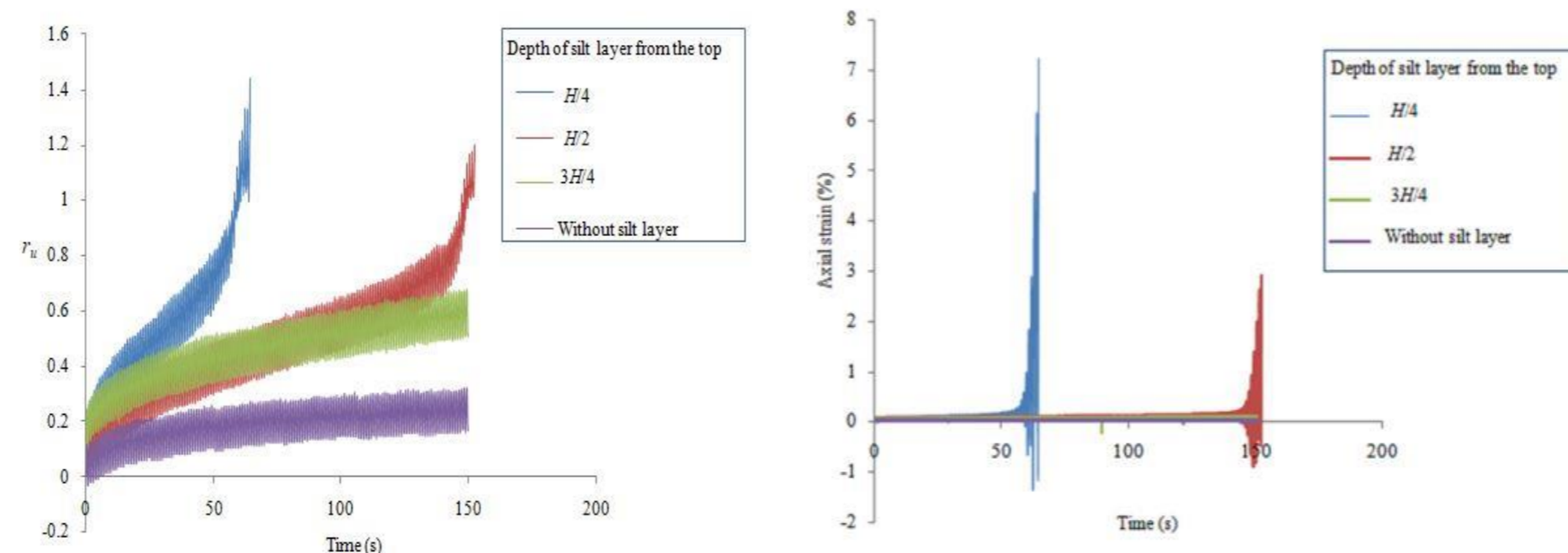
Intensity estimation for the 2001 Bhuj earthquake, India on ESI-07 scale and comparison with historical 16th June 1819 Allah Bund earthquake

$$\alpha = \frac{\tau_s}{\sigma'_{nc}} = \frac{q_s}{2 \times \sigma'_{nc}} = \frac{\sigma'_{1c} - \sigma'_{3c}}{\sigma'_{1c} + \sigma'_{3c}}$$

Initial shear stress ratio (α) was used by Yang and Sze (2011)

q_s = Initial static stress σ'_{nc} = Effective confining stress

Cyclic triaxial testing of stratified specimen



Pore pressure ratio vs time variation , Axial strain vs time variations for the stratified specimen

Conclusion

The presence of silt seam caused the early failures in the stratified specimen where the placement depth was $H/2$ from the top where H is height of the specimen.

In most of the specimens, the flow deformations caused sudden failure of the specimen at larger strains as observe in the medium dense specimens (relative density between 35% to 65%).

This work is beneficial in understanding towards the vulnerability of stratified soil mass present near sea shore, landfills, tailing dams, alluvial or marine deposits under initial static shear stresses.

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