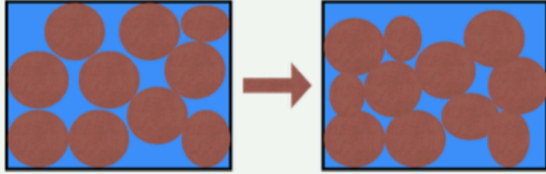


Can we reproduce site response accounting for soil nonlinearity and pore-pressure effects?

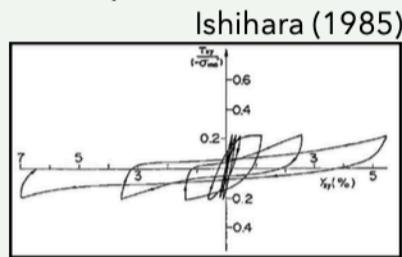
CYCLIC MOBILITY

Before loading After loading



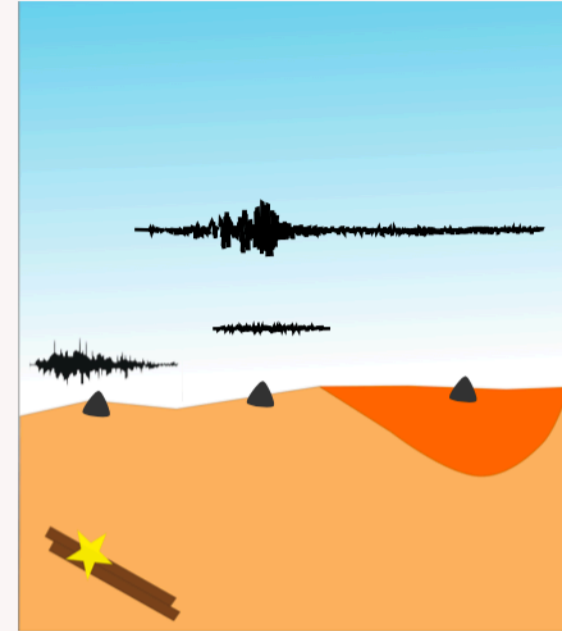
- ★ Instantaneous change in pore pressure (if no water evacuation)
- ★ Excess-pore pressure development due to shear loading

MORE Strength loss &
MORE permanent deformation



SITE EFFECTS

★ Significant change of wave energy and duration inside sedimentary basin (ex: The 1985 Mexico earthquake)

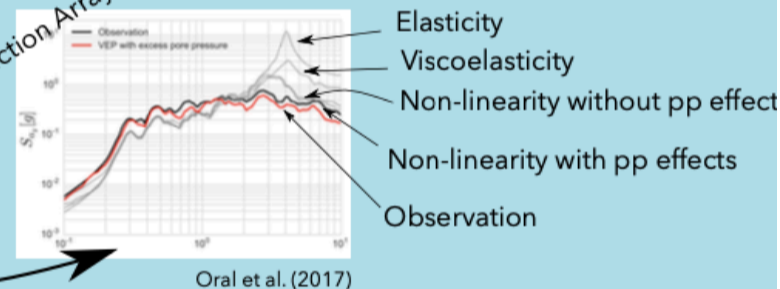


A linear approach is not sufficient to understand the combined effect of these phenomena on wave propagation

OUR APPROACH

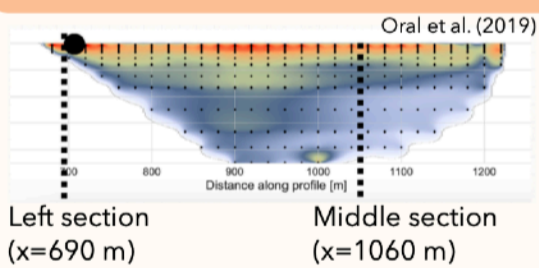
- MPlI model of Iwan (1967): Modelling hysteresis with use of friction angle & cohesion
- Liquefaction front model of lai et al. (1990): Modelling pore-pressure rise under shearing

verified in the case of Wildlife Refuge Liquefaction Array (Holzer et al., 1989)

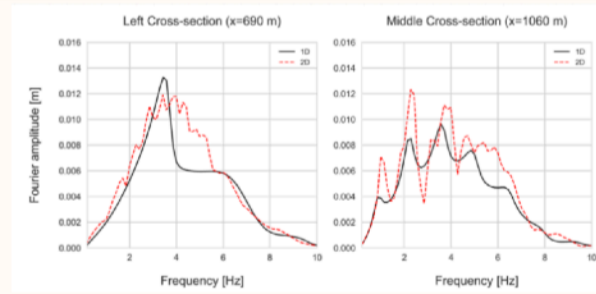


Oral et al. (2017)

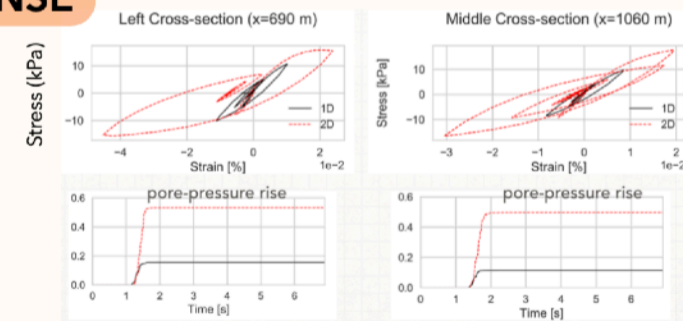
1D APPROACH UNDERESTIMATES NON-LINEAR BASIN RESPONSE



We compare the basin response in 1D and 2D approaches



★ 2D basin geometry leads to complex wave propagation also when non-linearity occurs



★ Pore-pressure excess and consequent strength loss are not predicted in 1D approach

Conclusion: Complex site requires the consideration of the coupled effect of soil and geometrical complexities

Big picture: Can we apply our approach to real sites? See the application on Kathmandu basin (Nepal).

More about codes:
see tutorials linked at homepage

synergistic work with
C. Gélis & L.F. Bonilla