

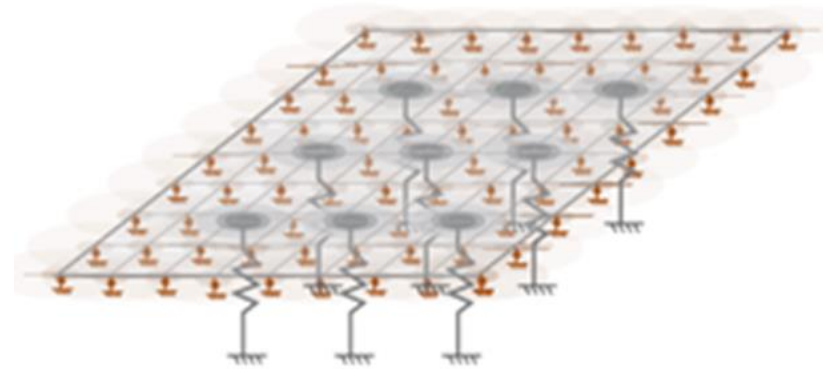
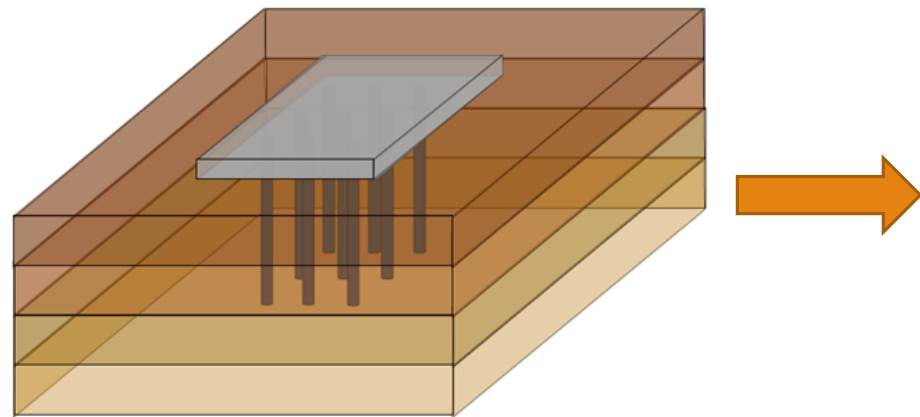
Hybrid numerical tool for nonlinear analysis of piled rafts

By Heitor C. Bernardes, Sofia L. Carvalho, Maurício M. Sales, Sylvia R. M. Almeida, Márcio M. Farias, Flávio A. X. C. Pinho

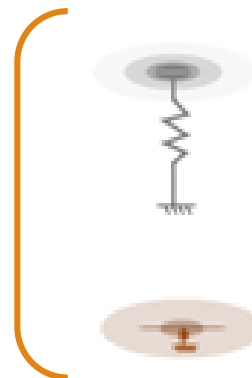
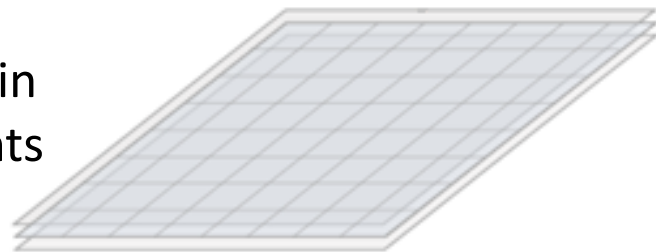
Soils and Foundations, Volume 59, Issue 6, December 2019, Pages 1659-1674.



Methodology – SoFIA (*Soil-Foundation Interaction Analysis*)

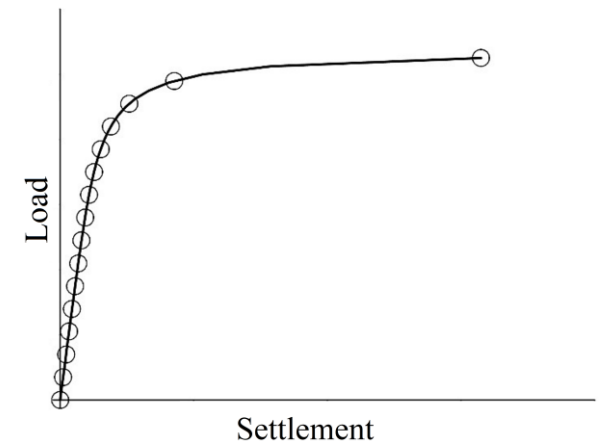


Kirchhoff or Mindlin
plate finite elements



Soil and pile stiffness, and their
respective interaction factors,
computed by axisymmetric FEA

Pile nonlinear response using a
hyperbolic function



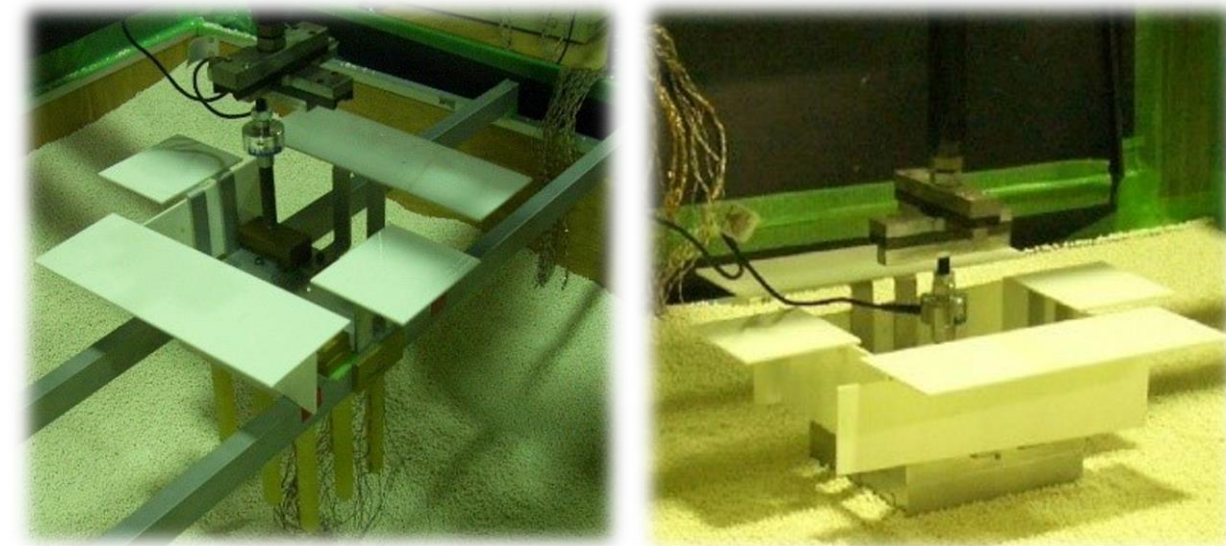
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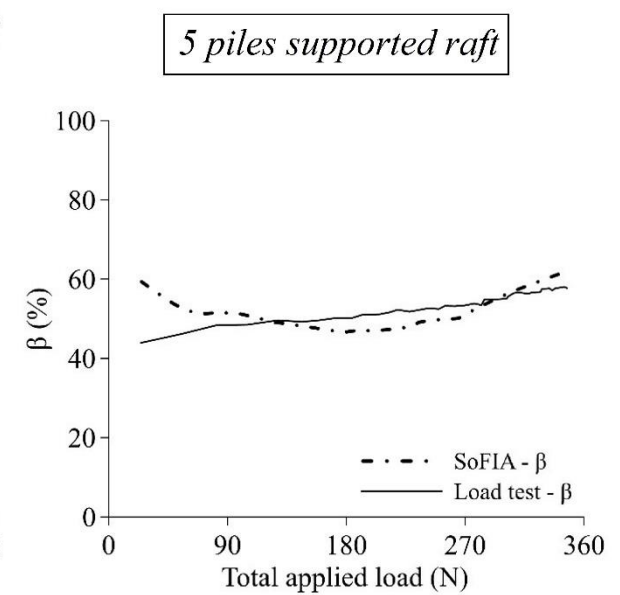
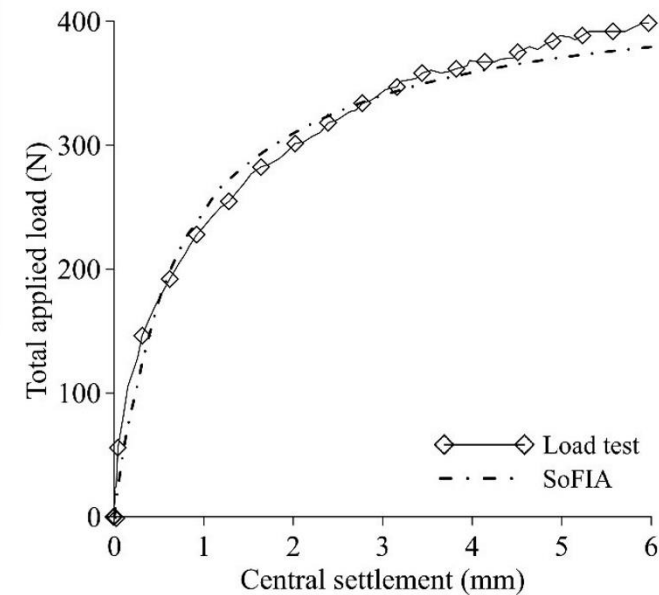
Results - Small-scale model tests



Small-scale model piled raft load tests, performed in NIT (Nagoya Institute of Technology), in Japan

Software was able to predict:

1. Piled raft load-settlement behaviour
2. Ultimate load capacity
3. Load distribution between the raft and the pile group



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Results – Case Study

SoFIA was used in the numerical analysis of the Hyde Park Cavalry Barracks, a 90 m high building in London

- The numerical analysis shows good agreement for both settlement and load distribution between the piles and the raft.
- The predictions were compared with other numerical tools and the differences were in an acceptable range from a practical point of view.

