

Nakano Lab

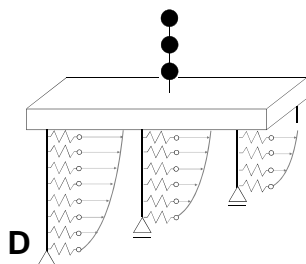
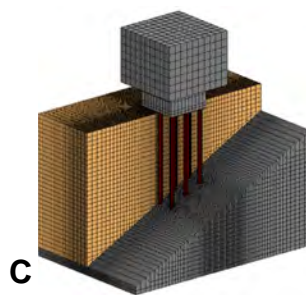
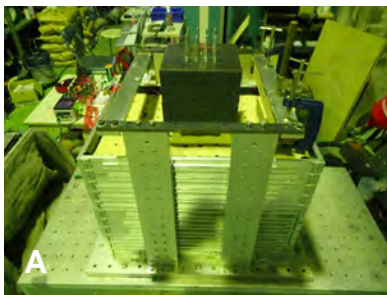
Modeling of earthquake behavior of soil-structure interaction systems

Multidisciplinary Resilience Research Center

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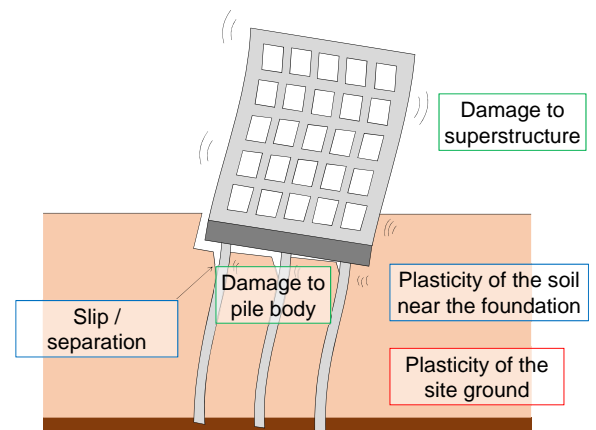
- Nonlinear soil-structure interaction (SSI)
- Numerical models for pile foundation
- Response reduction system using magnets

We are focusing on the dynamic behavior of foundations during earthquakes, which support buildings and act as paths for earthquake motion. We are conducting both experiments and numerical analyses on ground with an sloping bedrock, improved ground, and lunar regolith ground, etc. We are also working on the development of a response reduction device that uses magnets.



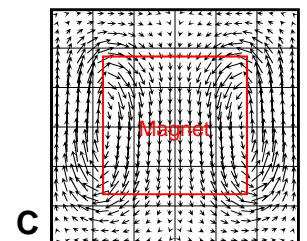
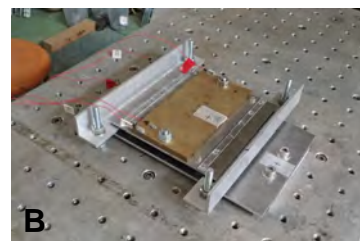
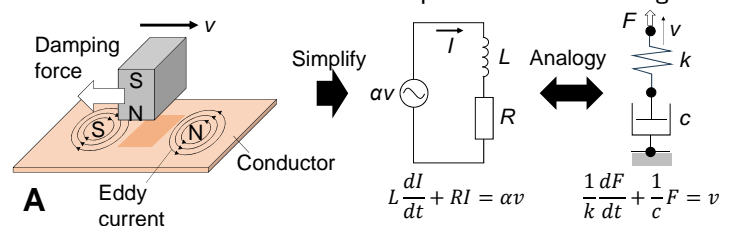
Pile group with a sloping bedrock

- Model shaking table experiment in a gravity field (A, B)
- 3D finite element model (C)
- Frame model representing ground resistance with springs (D)



Schematic of nonlinear SSI

- The vibration of a building is influenced by the softness of the ground and the dissipation of energy into the ground.
- During a large earthquake, the site ground, the ground near the foundation, and the structure become nonlinear, which influences the seismic response of the building.



Response reduction device using magnets

- Schematic of an eddy current damper (A)
- Shaking table experiment of a structure equipped with an eddy current damper (B)
- Calculated eddy current distribution (C)