Site Characterization of Micro Landform using Microtremor and Finite Element Method

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It is well known that the surface soil condition and micro topography are influential to the seismic intensity of the ground.

In this study, a series of microtremor observations were conducted in Chiba city which is considered to be situated on a complex topography.

Both one-dimensional and two-dimensional analyses were then performed and results were compared with microtremor observations.
Effect of Soil Conditions and Topography on Seismic Risk

AIJ "Earthquake motion and ground conditions - In commemoration of the 20th anniversary of the research subcommittee on earthquake ground motion." AIJ, 1993
Target Area: Chiba
Landform of Chiba
Location of Microtremor Observations

- Locations with boring data
- Locations near the SI sensors
Categorized H/V Spectra
Categorized Transfer Functions
Match between H/V Spectra and Transfer Functions
Analysis of Konakadai Area
Categorized H/V Spectra
Konakadai Area
2-D Finite Element Mesh Layout
Comparison between Observation and Analysis [1] Terrace/North
Comparison between Observation and Analysis [2] River Plain

**River Plain - Microtremor**

- Blue (d)
- Red (c)

**River Plain - Analysis**

- Blue (d) -- 2D FEM
- Red (c) -- 2D FEM
- Dashed blue (d) -- 1D SHAKE
- Dashed red (c) -- 1D SHAKE

![Graphs and cross-section diagram showing seismic amplification and analysis results for River Plain.](image-url)
Comparison between Observation and Analysis [3] Terrace/South
Detailed Investigation of Konakadai Area
Shape of H/V Spectra
- Terrace -
Shape of H/V Spectra
- River Plain -
Conclusions

In this study, a series of microtremor observations, 1-D and 2-D analyses were performed.

- It was confirmed that a one-dimensional parallel layer assumption is valid in the areas that are situated in the midst of a landform.
- However, multi-dimensional analyses are required for the area where landform varies significantly.
- H/V spectra obtained from microtremor observations can be used effectively for both areas.