

論文 / 著書情報
Article / Book Information

題目(和文)	
Title(English)	Exploration of shallow S-wave velocity profile in Bandung basin, Indonesia, using surface-wave phase velocity and microtremor horizontal-to-vertical ratio with linear velocity increase assumption
著者(和文)	AndiMuhamamPramatadie
Author(English)	Andi Muhamad Pramatadie
出典(和文)	学位:博士(学術), 学位授与機関:東京工業大学, 報告番号:甲第12141号, 授与年月日:2021年11月30日, 学位の種別:課程博士, 審査員:山中 浩明,淺輪 貴史,中村 恭志,海江田 秀志,盛川 仁,松岡 昌志
Citation(English)	Degree:Doctor (Academic), Conferring organization: Tokyo Institute of Technology, Report number:甲第12141号, Conferred date:2021/11/30, Degree Type:Course doctor, Examiner:,,,,,
学位種別(和文)	博士論文
Category(English)	Doctoral Thesis
種別(和文)	論文要旨
Type(English)	Summary

(論文博士)
(Dissertation Doctorate)

論 文 要 旨 (英 文) (800語程度)

Dissertation Summary (approx. 800 words in English)

報告番号 For administrative use only	乙 第 号	氏 名 Name	Andi Muhamad Pramatiadie
---	----------	-------------	--------------------------

(要 旨)
(Summary)

S-wave velocity profiles in the near-surface layers, especially in an earthquake-prone area, becomes one of important parameters for seismic hazard evaluation. An S-wave velocity profile can quantify the amplification and the resonant frequency of ground motion. This study aims are providing shallow S-wave velocity profiles in the Bandung basin, Indonesia, to characterize the soil amplification features for the seismic hazard evaluation in the basin using a simplified method considering limited available instruments in the area.

The methods to estimate an S-wave velocity (V_s) profile are based on observations of the surface-wave phase velocities and microtremor horizontal-to-vertical spectral ratios (H/V). We simplify a profile representation of an estimated profile by a linear function of S-wave velocity, so that the model parameters become only the surface S-wave velocity (V_1), the velocity-depth gradient, and the bedrock velocity. In this study, we fixed the bedrock S-wave velocity with a velocity of 500 m/s. Therefore, an estimation of V_s profile can be conducted by estimating the V_1 and the velocity gradient. Conventionally, a V_s profile can be obtained from an inversion using observed phase velocities. In addition to accommodate limitation of available instruments in Bandung, we propose a method to estimate a profile using H/V data and V_1 from field measurements.

The applicability of the proposed method is examined in the numerical tests using soil profiles from the boreholes in the basin and compared the results with the obtained ones from the conventional method. The numerical test results confirm the applicability of the proposed method. The estimated profiles from the proposed method having a good agreement to the true profiles with average relative differences around or less than 20% and providing similar results with the profiles obtained using the conventional method.

We then apply the actual profile estimation using the conventional and the proposed methods in the Bandung basin by deploying microtremors array measurements and V_1 -H/V measurements. We examine the appropriateness of the linear profile representation in the basin from the agreement between the observed phase velocities from the array measurements and the theoretical ones of the estimated profiles from the conventional method. The observed phase velocities from array measurements show that 23 of 25 sites of the observed phase velocities can be well explained by the

theoretical phase velocities using the linear profiles. It indicates the appropriateness of the profile representation using the linear function in the Bandung basin. The phase velocity comparison also confirms the suitability of the bedrock velocity assumption with 500 m/s. After that, we provide 29 additional S-wave velocity profiles in the basin using the proposed method. Finally, we use the estimated Vs profiles from the array and the V1-H/V measurements for the site characterization of site amplification in the Bandung basin.

The result of applying the methods to the data in the Bandung basin suggest that the time-averaged S-wave velocities in the top 30 m (V_{s30}) are below 150 m/s at sites located in the lake deposit (the central-eastern part of the basin). The characteristics of soil amplification factors in the lake deposit region are higher than six at frequencies below 1 Hz, due to the existence of the low velocity layers with thick sediment deposits. Meanwhile, at the sites situated in the volcanic deposit region, especially in the northwestern part of the basin, the site amplification factors are characterized by fundamental peak frequencies of 2 to 8 Hz with amplitudes below six due to the present of thin sediments with the high velocities layers.

備考：論文要旨は、和文2000字と英文300語を1部ずつ提出するか、もしくは英文800語を1部提出してください。

Note: Dissertation summaries must be written in either of the following formats: (A) both in Japanese (approx. 2000 characters) and in English (approx. 300 words), or (B) in English (approx. 800 words).

注意：論文要旨は、東工大リサーチリポジトリ（T2R2）にてインターネット公表されますので、公表可能な範囲の内容で作成してください。

Important: Dissertation summaries will be published online on the Tokyo Tech Research Repository (T2R2). Do not include information treated as confidential under certain circumstances.