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常時微動から建物の応答特性を抽出する新しい方法の提案
A New Method to Extract Building Response Parameters from Microtremor Data

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Generally, a building can be considered as a system which is composed of the upper structure, the base, and the supporting ground of the building. Therefore, the response of a building system can be seen as a composition of the response of the upper building (fixed-base building) and the response of rigid-body due to the soil-structure interaction including rocking and horizontal vibration (sway). In order to fulfill the building damage analysis meticulously, extracting the response parameters of (A) the building system, (B) the fixed-base building, and (C) the soil-structure interaction from ground motion records of buildings is very necessary. There have been proposed many methods to extract the building response parameters (A)-(C) respectively. The methods so far used need to have many observation points on the first and top floors. We proposed a simple and easy method to extract all of the building response parameters (A)-(C) from the fewest points, one on the first floor and one on the top of the building. Microtremor records are often used to extract building response parameters, because they can be easily obtained at any time.

The new method to extract the building response parameters (A)-(C) from microtremor records of the 1F and the top of the building is presented based on the Deconvolution method, which was proposed by Snieder and ?afak (2006) based on the interferometry method and was improved by Todorovska (2009a, 2009b). It is a very good method to extract the response parameters of fixed-base buildings and the base rocking vibration. The feasibility of this method to extract the response parameters from observed records on buildings during earthquakes has already been proved by the proposers. Based on the deconvolution method, in this paper, a method to extract the response frequencies of the building system ( ),the fixed-base building ( ), rigid-body rocking ( ), and rigid-body sway ( )from microtremor records on the top and the base of buildings is proposed. The feasibility of our method is examined by comparing the extracted building response parameters from microtremor data recorded on a 6-story building (Building No.2 in the Yakusa campus of the Aichi Institute of Technology) with those extracted from earthquake records on the same building and the numerical analysis results obtained based on the multi-degree-of-freedom model of this building. This method not only makes the extraction of building response parameters easier using only the records of the base and the top floor of buildings, but also provides an approach to extract the S-wave velocity traveling within the buildings using the records of the inter floors.

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