A Simple Evaluation Method for the Seismic Behavior of the Surface Ground in Consideration of Non-Linearity of Soil

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The seismic behaviour of the surface ground is greatly influenced by the non-linearity of soil, such as shear strength, degradation of shear stiffness with an increase in shear strain and so on. The simple evaluation method prescribed in the present seismic design standard, however, cannot consider the non-linearity of soil because only initial shear wave velocity, Vs, is used. This paper proposes a modified simple evaluation method, which is composed of two procedures. One is to select a ground classification for determining a design acceleration spectrum using the strength index of the whole surface ground, K_f. The other is to determine the vertical distribution of horizontal displacement by a mode analysis using Vs_{imp}, which is a shear wave velocity modified in consideration of the impedance ratio of each layer composing the surface ground. It was confirmed that the proposed method can give adequate result having almost the same accuracy as that obtained from non-linear dynamic ground response analysis.