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Maximum Deformation Estimation for Reinforced Concrete Buildings Using Equivalent Linearization Method

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Abstract : In the displacement-based seismic design and evaluation, equivalent linearization method is one of the approximation methods to estimate the maximum inelastic displacement response of a system. In this study, the accuracy of two equivalent linearization methods are investigated. The investigation consists of three soil condition in Taiwan (Taipei Basin 1, 2, and 3) and five different heights of building (H_r= 10, 20, 30, 40, and 50 m). The first method is the Taiwan equivalent linearization method (TELM) which was proposed based on Japanese equivalent linear method considering the modification factor, α_T= 0.85. On the basis of Lin and Miranda study, the second method is proposed with some modification considering Taiwan soil conditions. From this study, it is shown that Taiwanese equivalent linearization method gives better estimation compared to the modified Lin and Miranda method (MLM). The error index for the Taiwanese equivalent linearization method are 16%, 13%, and 12% for Taipei Basin 1, 2, and 3, respectively. Furthermore, a ductility demand spectrum of single-degree-of-freedom (SDOF) system is presented in this study as a guide for engineers to estimate the ductility demand of a structure.

Keywords : displacement-based design, ductility demand spectrum, equivalent linearization method, RC buildings, single-degree-of-freedom
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