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Seismic response analysis of sluice structure-soil system with deep soil deposit

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Abstract: Dynamic analysis method is needed for high seismic demand of sluice structures. Usually, sluice structures were commonly built on the soil layer with deep deposit. For the reason of complexity of such problems and engineering practices, the equivalent linear method was adopted in the dynamic response analysis of sluice structure-soil deposit system. On the statistic equivalent concept, the nonlinearity of soil material was addressed with linear solution method, so the problem was simplified. Concluding from a sluice structure analysis, that (1) comparing to the normal elastic solution, rational results can be obtained by equivalent linear method which considering nonlinearity of foundation soil, (2) the response of upper frame was bigger than the sluice pier, which need much more concern in the structure design, (3) when considering deep deposit soil layers, the effects of seismic inputs with long periods should be more concerned, (4) equivalent linear method take considering nonlinearity of soils by statistical equivalent method, with many engineering test data and experiences, it also convenient to expand to true nonlinear material model method.

Key words: sluice structure; soil-structure interaction; deep soil deposit; dynamic soil model; equivalent linear method