

عنوان مقاله:

Active Structural Control by Backstepping Design Considering Soil-structure Interaction Effects

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خلاصه مقاله:

Considering the dependency of control algorithms to the structural dynamic properties that are affected by soil structure interactions (SSI), the investigation of SSI effect on different control methods has gained great importance. Backstepping design as a recursive Lyapunov-based method is one of the powerful active control approaches. However, the effect of soil structure interaction on it has not yet been investigated. This paper studies the performance of backstepping design on mitigating the seismic response of a building structure subjected to base excitations, considering the SSI effect. For this purpose, the SSI model equations were entered in the control algorithm and various shear wave velocities were considered to demonstrate the performance of backstepping control design on soft and stiff soil. According to the numerical results, for structures rested on stiff soil, the variations in the responses of controlled structure caused by SSI is negligible. However, in the case of soft soil, SSI effects cause noticeable changes in dynamic responses of controlled structure that cannot be ignored.

کلمات کلیدی:

soil-structure interaction (SSI), Active control, Lyapunov-based method, Backstepping design, Shear wave velocity

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