Title

伝熱を考慮した鉛プラグ入り積層ゴムの復元力モデルに関する研究

Analytical Model for Lead-Rubber Bearings Considering Heat Conduction

Abstract

Today, the seismic isolation technology has been applied for many countries. Lead-rubber bearings (LRB) are one of the seismic isolators which consists of natural rubber, steel plates, and a lead plug. It is known that LRB absorbs the seismic energy and the energy is transformed into the thermal energy. The lead core heating in LRB causes strength degradation and lead plugs melting because the melting point of lead plugs is not so high (327.5℃). The relation between heat conduction and temperature rise about lead plugs remains to be elucidated. The purposes of this proposal are making clear the heat conduction in LRB under the earthquake response and suggesting the safer LRB model. We make programs about Multiple Shear Springs (MSS) model include thermal conductivity analysis. We also check consistency of this model by means of comparing the analytical and the experimental data. Then, we analyze various cases using the model and Kikuchi-Aiken LRB material model which produces nonlinear hysteretic curves of LRB. Finally, we confirm the effects of damping characteristics in line with the temperature rise and found the safer LRB model. These findings suggest that the model which we made correctly shows heating of lead plugs and the new model solved existing thermal problem. This study can be applied to structural design and the development of LRB all over the world.

Keywords

Seismic isolation, Lead-rubber bearings, Lead core heating, Temperature increase, Strength degradation

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1 件のメッセージ

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