

Natural Frequency Automatic Variation in Earthquake Isolation System

This system is not “new” in the unique sense of the word, but it could be considered as such, because it is the result of a merger between two of my original systems, of which it maintains the most advantageous relative characteristics.

Its operational aspect is as effective as that of the systems from which it originates, but it is considerably superior to both of them, because of the reduced planning aspect and the operational simplicity, which, together with the greater economic competitiveness, certainly make it more acceptable.

In fact, the main change from the former system is that the complicated, electronically started, frequency converters present in the former reference system are replaced by the naturally started, simple device of the second system. Neither the number of bearings nor their sliding, plane surface have been changed.

Having said this, the proposed system is based on the following operations:

- interruption of the continuity between the building and the foundation-soil complex;
- laying of four elastic movable bearings with sliding or rolling friction;
- self-centering of the building after an earthquake.

By means of its own elastic deformation, each bearing can automatically compensate the rigid deflection variation relative to support due to the horizontal component of the motion.

The building remains motionless with respect to the foundation-soil complex, which moves. Due to the sub-undulatory shock, the vertical motion varies the building behavior only partially.

It is subjected to a low vertical translation and to the potentiality of resonance. In order to prevent the resonance danger, the natural automatic vertical frequency variation of the building takes place because of auxiliary springs, present in each bearing, which increase the action of the main spring during an emergency, characterized by an interval of vertical seismic frequencies, including the resonance one.