



## The Sliding Isolation Pendulum for seismic Protection of Buildings

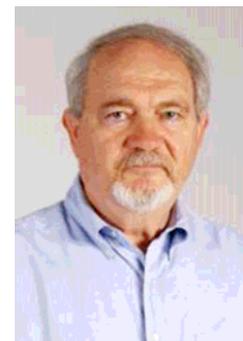
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### Summary

Special measures for effective seismic protection of buildings are and will be applied more often in the future due to increasing requirements. The impact requirements, i.e. the earthquake data, get more severe, as in many countries revised probabilities for more severe earthquakes were and will be defined. On the resistance side the standards and national requirements define new limits for maximum stresses and accelerations within the building structure to provide best possible damage limitation. The principle of seismic isolation is a method to provide structural flexibility to avoid big accelerations within the structure. The Sliding Isolation Pendulum (SIP) is a device decoupling the structure from the ground, supporting the entire structure, granting for the necessary damping and ensuring the re-centring of the structure during and after an earthquake. The application of the SIP is illustrated for three recently constructed buildings in Greece and Turkey.

**Keywords:** Seismic Isolator, Sliding Pendulum, Friction Pendulum, Seismic Protection.

### 1. Introduction

The increased demands of building standards (EURO CODE, etc.) with regard to seismic impact values create a necessity to adopt the seismic protection measures for these buildings according to the state of the art.

The characteristics of earthquakes and the mechanisms causing huge damages are well known today. However seismic engineers have got not always a clear idea how to fight against the seismic *enemy*. The earthquake is mostly considered to be a force and a deformation within a structure. Thus the designer consequently thinks usually only about increasing the strength of the structural parts. The forces and displacements are a final result, which occur within the structural parts, but earthquakes are essentially energy phenomena, in which enormous amounts of mechanical energy are accumulated throughout the bedrock for decades or even centuries, to be suddenly released in very short periods of time [1]. Therefore, to achieve a best possible seismic protection, the defence strategies must consider the energy characteristic of earthquakes.

There are two ways the designer of a building may follow depending on the seismic impact energies (Fig. 1). The first way is the above mentioned strengthening concept, making a structure rigid to resist the seismic impact. This approach, which will not be described further within this paper, may be reasonable for low seismic impacts and less important buildings. The second way to follow is the principle of mitigation guiding us finally to the idea of seismic isolation combined with energy dissipation.

For seismic isolation several types of isolators are available. One of these types is the Sliding Isolation Pendulum (SIP).