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**Autor:** D'Agostino, Salvatore / Frunzio, Giorgio  
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## **Consequences of Small Earthquakes on the Artistic Heritage**

Conséquences de faibles séismes sur l'héritage artistique

Auswirkungen schwacher Erdbeben auf das Kunsterbe

**Salvatore D'AGOSTINO**

Prof.  
Univ. Federico II  
Naples, Italy

**Giorgio FRUNZIO**

Prof.  
Univ. Federico II  
Naples, Italy

The methodical study of defence from seismic risk of artistic heritage has considerably spreaded in the last years, increasing researchers' interest about problems concerning monumental building.

In spite of this diffused interest there are not scientific and methodical contributes examining the problem of work of art safety. The only research to consider as a specific reference point in this field can be that one performed at Getty Museum of Malibu [1,2]: in Italy, a country full of works of art and with a large part of its territory exposed to seismic risk, there are few researchers interested in the subject [3,6,7].

At last, there are not national or international Codes imposing behaviour to obtain sure results.

As a first step it is obviously very important to classify the wide range of objects according to their form, dimensions and way of exhibition.

The general purpose of this research program .is to give indications suitable for a great part of the situations that can occur in a Museum. This paper, as a first step, examines the single object as a rigid body simply supported on the main structure ( leaving out of account the filter' s effect due to the action of structure on the show-case).

Based on the results of precedent studies concerning a generic body and the ones mentioned about the specificity of the objects of art [4,6], this paper reports the results of a set of experiences performed with the aim of establishing the variableness of the effects with the variation of friction conditions between the objects and the fixed floor, the object' s frequency and the increase of dissipated energy when there are oscillations and collisions between the objects and the show-case.

These experimental investigations are completely originals. They have been made using reproductions of vases and small statues supported on a plate oscillating with sinusoidal law.



Experiences have attested the *theoretical* results obtained and they march side by side with that ones made in Japan on parallelepipeds.

Different material interposed allowed to obtain the expected results about *sliding and tipping*, as to measure the effective displacements with frequencies and period of simulation near to the real one.

Effective displacements are very important if the object's sliding is established as a desirable situation. In this case it is necessary to evaluate possible relative displacements in order to avoid incidental collisions.

Among different hypothesis made, it is very interesting the combination obtained increasing dimensions of the base by applying a plexiglass pedestal and controlling the friction between object and show case interposing a film of plastic material.

This study has been carried out contacting some Directors of Italian Museums, periodically subjected to seismic events of different intensity. Every one agreed about the necessity of carefully examining these themes and extending them to all the classes of objects, not only the simply supported ones, because there are no indications and the few interventions made depended on the sensibility of experts.

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