

On the Monitoring of Structures and Soils by Tromograph

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Abstract : Since 2009, with the coming into force of the January 14, 2008 Ministerial Decree "New technical standards for construction", and the explanatory ministerial circular N°.617 of February 2, 2009, the question of seismic hazard and the design of seismic-resistant structures in Italy has acquired increasing importance. One of the most discussed aspects in recent Italian and international scientific literature concerns the dynamic interaction between land and structure, and the effects which dynamic coupling may have on individual buildings. In effect, from systems dynamics, it is well known that resonance can have catastrophic effects on a stimulated system, leading to a response that is not compatible with the provisions in the design phase. The method used in this study to estimate the frequency of oscillation of the structure is as follows: the analysis of HVSR (Horizontal to Vertical Spectral Ratio) relations. This allows for evaluation of very simple oscillation frequencies for land and structures. The tool used for data acquisition is an experimental digital tromograph. This is an engineered development of the experimental Languamply RE 4500 tromograph, equipped with an engineered amplification circuit and improved electronically using extremely small electronic components (size of each individual amplifier 16 x 26 mm). This tromograph is a modular system, completely "free" and "open", designed to interface Windows, Linux, OSX and Android with the outside world. It an amplifier designed to carry out microtremor measurements, yet which will also be useful for seismological and seismic measurements in general. The development of single amplifiers of small dimension allows for a very clean signal since being able to position it a few centimetres from the geophone eliminates cable "antenna" phenomena, which is a necessary characteristic in seeking to have signals which are clean at the very low voltages to be measured.

Keywords : microtremor, HVSR, tromograph, structural engineering

Conference Title : ICESE 2015 : International Conference on Earthquake and Structural Engineering

Conference Location : Prague, Czechia

Conference Dates : March 23-24, 2015