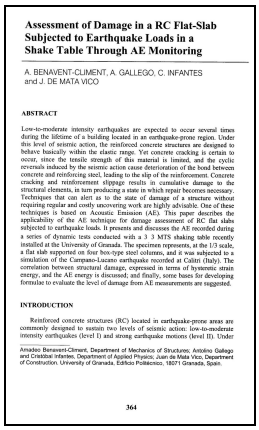

Assessment of Damage in a RC Flat-Slab Subjected to Earthquake Loads in a Shake Table Through AE Monitoring

A. BENAVENT-CLIMENT, A. GALLEGO, C. INFANTES and J. DE MATA VICO

ABSTRACT

Low-to-moderate intensity earthquakes are expected to occur several times during the lifetime of a building located in an earthquake-prone region. Under this level of seismic action, the reinforced concrete structures are designed to behave basically within the elastic range. Yet concrete cracking is certain to occur, since the tensile strength of this material is limited, and the cyclic reversals induced by the seismic action cause deterioration of the bond between concrete and reinforcing steel, leading to the slip of the reinforcement. Concrete cracking and reinforcement slippage results in cumulative damage to the structural elements, in turn producing a state in which repair becomes necessary. Techniques that can alert as to the state of damage of a structure without requiring regular and costly uncovering work are highly advisable. One of these techniques is based on Acoustic Emission (AE). This paper describes the applicability of the AE technique for damage assessment of RC flat slabs subjected to earthquake loads. It presents and discusses the AE recorded during a series of dynamic tests conducted with a 3 3 MTS shaking table recently installed at the University of Granada. The specimen represents, at the 1/3 scale, a flat slab supported on four box-type steel columns, and it was subjected to a simulation of the Campano-Lucano earthquake recorded at Calitri (Italy). The correlation between structural damage, expressed in terms of hysteretic strain energy, and the AE energy is discussed; and finally, some bases for developing formulae to evaluate the level of damage from AE measurements are suggested.

INTRODUCTION

Reinforced concrete structures (RC) located in earthquake-prone areas are commonly designed to sustain two levels of seismic action: low-to-moderate intensity earthquakes (level I) and strong earthquake motions (level II). Under

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Код: 10595

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Издательство DEStech Publications, Lancaster, 2010 год

6 стр; формат: 23,5 x 16 см
ISBN: 978-1-60595-024-2

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Ключевые слова:

Содержание.