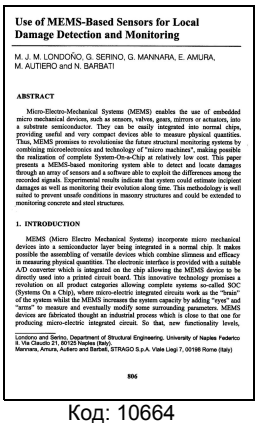

Use of MEMS-Based Sensors for Local Damage Detection and Monitoring

M. J. M. LONDOÑO, G. SERINO, G. MANNARA, E. AMURA, M. AUTIERO and N. BARBATI

ABSTRACT

Micro-Electro-Mechanical Systems (MEMS) enables the use of embedded micro mechanical devices, such as sensors, valves, gears, mirrors or actuators, into a substrate semiconductor. They can be easily integrated into normal chips, providing useful and very compact devices able to measure physical quantities. Thus, MEMS promises to revolutionise the future structural monitoring systems by combining microelectronics and technology of "micro machines", making possible the realization of complete System-On-a-Chip at relatively low cost. This paper presents a MEMS-based monitoring system able to detect and locate damages through an array of sensors and a software able to exploit the differences among the recorded signals. Experimental results indicate that system could estimate incipient damages as well as monitoring their evolution along time. This methodology is well suited to prevent unsafe conditions in masonry structures and could be extended to monitoring concrete and steel structures.

1. INTRODUCTION

MEMS (Micro Electro Mechanical Systems) incorporate micro mechanical devices into a semiconductor layer being integrated in a normal chip. It makes possible the assembling of versatile devices which combine slimness and efficacy in measuring physical quantities. The electronic interface is provided with a suitable A/D converter which is integrated on the chip allowing the MEMS device to be directly used into a printed circuit board. This innovative technology promises a revolution on all product categories allowing complete systems so-called SOC (Systems On a Chip), where micro-electric integrated circuits work as the "brain" of the system whilst the MEMS increases the system capacity by adding "eyes" and "arms" to measure and eventually modify some surrounding parameters. MEMS devices are fabricated thought an industrial process which is close to that one for producing micro-electric integrated circuit. So that, new functionality levels,

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Ключевые слова:

Содержание.