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DAMAGE QUANTIFICATION OF INFRASTRUCTURES BY MEANS OF ACOUSTIC EMISSION TECHNIQUE

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TOMOKI SHIOTANI¹⁾, SHOHEI MOMOKI²⁾ AND DIMITRIOS G. AGGELIS³⁾

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1) Dept.of Urban Management, Graduate School of Engineering, Kyoto University
C1-2-236, Kyoto-Daigaku-Katsura, Nishikyo-Ku, Kyoto 615-8540, Japan

2) Research Institute of Technology, Tobishima Corporation
5472 Kimagase, Noda-Shi, Chiba 270-0222, Japan

3) Materials Science and Technology Dept., University of Ioannina
45110 Ioannina, Greece

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ABSTRACT

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Global monitoring is a demanding issue for ageing infrastructures. In order to sustain those as long as possible, proper maintenance programs shall be examined considering the current structural integrity as well as presumptive deterioration processes. Acoustic Emission (AE) is one of the NDE techniques that has the potential to inspect large volumes with less numbers of transducers placed in the strategic location of structure. In this paper, the AE technique is used to characterize the structural condition of large concrete structures. Through the AE monitoring it was concluded that: AE monitoring could evaluate the structural integrity sensitively especially even from the initial damage of the PC bridge deck; and repair effectiveness could be characterized quantitatively by AE related damage indices

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KEY WORDS

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Ageing, Damage quantification, Infrastructures, Maintenance programs, Structural integrity

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INTRODUCTION

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Civil structures in Japan have been constructed rapidly since 1960s, and these structures have almost reached their termination of service-life recently i.e., these must be renewed in terms of their life-time expectancy [1]; however, the limited or lowered budget due to revenue shortage may not allowed to re-construct those, and therefore the demanding is placed focusing on the reasonable rehabilitation programs instead [2].

The present paper describes the strategic way of AE monitoring as a global health monitoring of large infrastructures. Specifically using a long span of bridge deck, the most likely deteriorated part of the structures is extracted, followed by detailed AE monitoring. AE monitoring is also performed through the repair project of concrete piers in an intake dam facility.

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REQUIREMENTS OF INFRA-ASSET MANAGMENT

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With respect to optimum preventive maintenance, current damage of infra- structures should be quantified with some proper monitoring techniques [3]. Using the measured data to quantify the health status in discrete time steps, a fitted curve estimates the further deterioration process in extrapolated region (see the dashed-line in Fig. 1). Monitoring is then considered to be a crucial procedure through the infra-asset management. One can understand that the accurate result of monitoring provides highly reliable information on the further deterioration process, that can be more solidified if the subsequent executions of monitoring were performed, resulting in the suggestions of proper timing of repair project.

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Subheading

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The relation between construction components is given in Equation (1). These components were

$$mA + B = nC + D$$

Correlation between these AE data...

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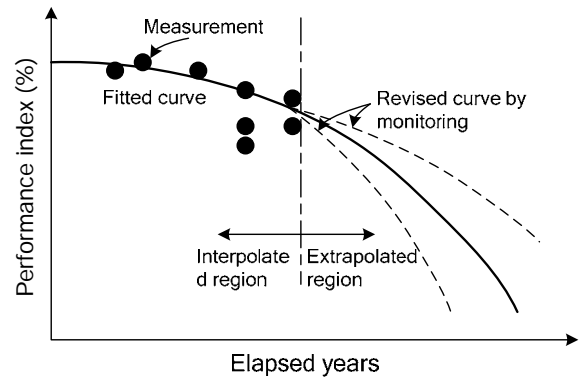


Figure 1. Estimation of performance index.

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