Approach and methodology in understanding the structural behaviour of historic arch bridges through dynamic monitoring: the case of Rialto bridge in Venice

Giosuè BOSCATO
Dottore di Ricerca
Università Iuav di Venezia
Venezia, Italia
gboscato@iuav.it

Angelo DI TOMMASO
Professore
Università Iuav di Venezia
Venezia, Italia
adt@iuav.it

Francesco GUERRA
Professore
Università Iuav di Venezia
Venezia, Italia
guerra2@iuav.it

Lorenzo LAZZARINI
Professore
Università Iuav di Venezia
Venezia, Italia
lorenzo.lazzarini@iuav.it

Alberto MAZZUCATO
Professore
Università Iuav di Venezia
Venezia, Italia
alberto.mazzucato@iuav.it

Marco PIZZOLATO
Ingegnere Civile
Università Iuav di Venezia
Venezia, Italia
marco-pizzolato@libero.it

Salvatore RUSSO
Professore
Università Iuav di Venezia
Venezia, Italia
russo@iuav.it

Francesca SCIARRETTA
Dottore di Ricerca
Università Iuav di Venezia
Venezia, Italia
scifra@iuav.it

Elena SPEROTTO
Dottoranda
Università degli studi di
Brescia, Italia
esperotto@iuav.it

Summary

Non destructive analysis on the structural behaviour of monuments or historical buildings represents by now the most important way to understand the mechanical performance and the level of decay - both for local and global aspects; this without invading and also as a preliminary approach in view of more adaptive reinforcement/restoration interventions.

In this field, the dynamic identification – especially through the analysis of the environmental effects – is a strategic choice to improve knowledge on the state of conservation. This kind of procedure is generally more suitable for slender structures like towers or bridges, but could be useful in analysing structural parts or in solving local problems of buildings with low slenderness. Indeed this paper focuses on a very interesting case, i.e. the Rialto bridge in Venice. The paper explains the details of the methodological approach, in the frame of a more extensive integrated research that involves the wide Research Group on "Assessment of historical buildings" of the Iuav University, to which the authors of this paper belong.

Keywords: health monitoring, non destructive test, dynamic identification

1. Introduction

An integrated control of a monumental building – through advanced dynamic monitoring and non destructive / microdestructive testing – aims to define the current state of health as well as a knowledge basis to elaborate guidelines for maintenance.

Following these intents, the City of Venice decided to acquire scientific and technical information on the Rialto bridge, by appealing to the IUAV University. A cognitive monitoring plan was thus elaborated, whose overall coordinator is the City of Venice; the IUAV University of Venice contributes with its Laboratories and afferent teachers and researchers, whose scientific coordinator is prof. Salvatore Russo. In particular, the involved laboratories are: LAMA (Analysis of Ancient Materials), CIRCE (Cartography, Survey and Digital Survey) and LabSCo (Strength of Materials)

A multi-disciplinary approach was found necessary to get the widest and most careful knowledge of the whole building, so to point out the causes and the levels of current decay processes. Indeed