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Integration of ground-penetrating radar, ultrasonic tests and infrared thermography for the analysis of a precious medieval rose window

L. Nuzzo[1], A. Calia[2], D. Liberatore[3], N. Masini[4], and E. Rizzo[5]
[1]Ingegneria dei Sistemi LTD – IDS (UK), Fareham, Hampshire, UK
[2]Istituto Beni Archeologici e Monumentali, IBAM-CNR, Lecce, Italy
[3]Dipartimento di Ingegneria Strutturale e Geotecnica, University of Rome "La Sapienza", Italy
[4]Istituto Beni Archeologici e Monumentali, IBAM-CNR, Tito Scalo (PZ), Italy
[5]Istituto di Metodologie per l'Analisi Ambientale, IMAA-CNR, Tito Scalo (PZ), Italy

Abstract. The integration of high-resolution, non-invasive geophysical techniques (such as ground-penetrating radar or GPR) with emerging sensing techniques (acoustics, thermography) can complement limited destructive tests to provide a suitable methodology for a multi-scale assessment of the state of preservation, material and construction components of monuments. This paper presents the results of the application of GPR, infrared thermography (IRT) and ultrasonic tests to the 13th century rose window of Troia Cathedral (Apulia, Italy), affected by widespread decay and instability problems caused by the 1731 earthquake and reactivated by recent seismic activity. This integrated approach provided a wide amount of complementary information at different scales, ranging from the sub-centimetre size of the metallic joints between the various architectural elements, narrow fractures and thin mortar fillings, up to the sub-metre scale of the internal masonry structure of the circular ashlar curb linking the rose window to the façade, which was essential to understand the original building technique and to design an effective restoration strategy.

Full Article in PDF (PDF, 1155 KB)

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