

## **INVESTIGATION OF HERITAGE BUILDING MATERIALS BY NON DESTRUCTIVE METHODS**

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Quantitative IR Thermography (QIRT) and ultrasonic pulse velocity (UPV) measurements are used with a new integrated approach, for the evaluation of the mechanical and thermal properties of building materials. In such a way, the status and decay of the stones used on heritage buildings are tested non destructively (NDT). The thermal diffusivity is measured using a single face procedure and compared with the UPV results in order to set up a new technique suitable to work in situ.

Diffusivity could be measured without contact and sampling the material, it is well correlated with the elastic wave velocity, which has a higher probing capability in depth. The test is based on a laser shot of the surface and the temperature variation on the surface is monitored in space and time by IR Thermography. The data reduction is applied in the frequency domain, it allows achieving the thermal diffusivity with a robust algorithm not affected by the boundary conditions.

Diffusivity and UPV measured in direct and indirect way, according to the standards, usefully contribute to the study of the ageing process acting on the surface and in depth.

Measures has been performed on different limestones, tuff and marble. The state of deterioration of the samples were also examined by other methods, such as uniaxial compressive strength and microscopy.

Fresh and aged samples were examined in terms of some physical and mechanical properties variations.