



NANT 2016

**Book of Abstracts of
Third International Conference
MODERN METHODS OF TESTING AND EVALUATION
IN SCIENCE**

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ACOUSTIC-OPTIC APPROACH FOR THE EXAMINATION OF MATERIALS CONDITION IN CULTURAL HERITAGE OBJECTS

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Considering couplings of different disciplines optoacoustic, acousto-optics, beside of disciplines' possibilities separately, these approaches are usable for the examination of materials' conditions in objects of cultural heritage.

Resonant phenomena, elastic and non-elastic, linear and non-linear phenomena in rocks and stone artefacts are objects of multidisciplinary studies. Sampling and data collecting regarding inner structures (and history) for the purpose of mining, geology, findings of oil and gas, Space waste examination, etc. require various methods. Actual methods potentially provide whole spectrum of choices depending on diagnostics.

Linking of holographic methods and primary seismic approaches, as well as the examination of resonance concerning layers' prediction, disasters and cracks, lead to questions which neural networks, Brillouin scattering and holographic-numerical approaches resolved during long time practice. This is the area in which the optical methods throughout refraction indices and approximations are tied to the elasticity moduli, pores' examination, ultrasound and Briollouin measurements.

The usage of artificial neural networks (ANN) for various problems and processes prediction deserves special attention. In numerous references various applications can be found (e.g. maximum surface crack width of precast reinforced concrete (RC) structures; modelling of laser materials processing; etc.) offering comparisons of different training algorithms, such as back propagation (BPANN) and genetic algorithms (GANN), applied on civil engineering structures, machine technology features, models' simplifications, etc. Further analyses in this area are of great importance.

Keywords: acousto-optical processes, algorithms, cracks prediction