



Geophysical techniques for the characterization of settlement phenomenon in building foundations

Luigi Capozzoli, Enzo Rizzo, and Gregory De Martino

CNR-IMAA (Hydrogeosite Laboratory), Hydrogeosite Laboratory, Marsico Nuovo (PZ), Italy (rizzo@imaa.cnr.it)

The necessity to characterize the decay of engineering structures realized in the last decades drives to seek the research to use innovative approaches to determine and characterize effectively and non-invasively the state of conservation of the elements that belong to old or more recent engineering structures. The use of geophysical techniques for analysing RC structures is well-known and is often simplified by a a-priori knowledge of examined structures. The possibility of use some geophysical techniques like ground penetrating radar, self potential method and electrical resistivity tomographies is increased by the potentialities of these methods in particular as regard their non-invasivity or low-invasivity. Further these methods are less expensive if compared with destructive and semi-destructive techniques and can give global information about the behaviour of the analysed structures.

Moreover some uncertainties reduce the capability of the geophysical approach that need of direct measurements able to support the interpretation of the obtained data. Indeed, there are some cases where it is not easy identify the causes of degradation of structures. This is particularly true for the problems of settlement that occur in the civil buildings able to accelerate the deterioration of the life conditions of the engineering elements especially for the foundations.

For analysing the contribution that geophysics can offer to solve engineering issues some laboratory tests are realized in controlled conditions at the Hydrogeosite laboratory of CNR-IMAA using active and passive electrical and electromagnetic methods. Further some real applications are studied where ground penetrating radar and electrical resistivity tomographies are used in tandem to identify the real contribution that geophysical techniques can give to identify problems occurring within reinforced concrete foundations.

The showed experiences highlight the importance of geophysical techniques among more classic non destructive methods from one side and the significance of the comparison and integration of the data in order to reduce the obvious uncertainties related mainly to resolution and depth of penetration of the adopted methods.