

**STATISTICAL ANALYSIS IN INTEGRATION OF THERMAL
IMAGING AND GNSS SATELLITE MEASUREMENTS
IN RELATION TO GEOLOGICAL STRUCTURE AS A METHOD
TO IMPROVE THE ACCURACY OF DISPLACEMENT
DETERMINATION OF ENGINEERING STRUCTURES**

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The aim of my research was to carry out statistical analyses using multiple regression for 54 benchmarks from the Szczecin area and 106 from the Wrocław area. On the basis of the research, geological factors were identified whose change most influences the displacements in the immediate vicinity of the object. The analyses were carried out using the statistica program. The distribution of fits for displacements was followed up in relation to the individual factors. This is the first step towards the creation of a comprehensive algorithm to improve the accuracy of displacement measurement of engineering objects. On this basis, a version of a genetic algorithm was also proposed to complement the data obtained using regression. The study revealed that the greatest influence on failure is exerted by changes in the soil organic matter content and fluctuations in the water table. This is also confirmed by the geological observations of the relationship between soil compaction, water content and Young's modulus. The next stage of the work will be to carry out GNSS satellite surveys and radiometric measurements with reference to geologically stable benchmarks in the Wrocław area. It is assumed that a measurement accuracy of less than 1 mm per year for vertical and horizontal coordinates will be achieved. This will make it possible to trace deformations which are difficult to detect, caused, for example, by movements of salt formations which can cause gas reservoirs to leak.