



S I L E S I A N U N I V E R S I T Y
O F T E C H N O L O G Y
F A C U L T Y O F C I V I L E N G I N E E R I N G

Doctoral dissertation

Topic:

Development of theoretical basis of a new method of rectifying buildings subjected to mining influences, which allows minimizing the associated costs

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ABSTRACT

As a result of underground mining of minerals, especially hard coal in the region of Upper Silesia, tremors of mining origin occur and the original surface of the land is subject to forced changes in the form of ground deformation. One such effect is the inclination of the terrain and the related leaning of buildings located in this area. Although the threat to the structure of the building, caused by its leaning from the vertical of a maximum of a few percent, is not great, the use of such buildings is very burdensome. This leads to the need to rectify the objects, which in turn generates high costs, often reaching the value of the straightened objects and as we know, all participants in the construction process, as well as later users, depend mainly on long-term and failure-free operation of buildings.

Therefore, in the doctoral dissertation, it was decided to define the requirements of a new, probably cheaper method of rectifying buildings, which will be adapted to this process already at the design stage. An additional advantage of such a system is the fact that the rectification process itself will require minimal preparation and the process itself can be repeated many times, which is impossible with the currently used rectification processes.

In the doctoral dissertation, the behaviour of the sliding layers of the building foundations was analysed, as well as the analysis of the behaviour of the sliding layers and the structure of a double plate reinforced concrete foundation with a sliding layer at the junction between its two parts, under vertical loads (simulating the loads exerted on the ground by medium-sized single-family and multi-family residential buildings) and horizontal (simulating the loads exerted on the foundation by hydraulic cylinders during the rectification process).

Conclusions drawn after carrying out theoretical, laboratory and numerical analyses are both scientific and practical. They will make it possible to secure and protect buildings against the impact of mining ground deformations. Attempts at numerical analyses of rectification in any areas covered by the problem of mining damage are an opportunity to generalize the theorems resulting from the doctoral dissertation. Therefore, the correct shaping, construction and calculation of newly designed buildings, so that they are able to take over the mining impacts caused by continuous deformations of the terrain, will also guarantee the right decisions regarding the choice of the method of foundation and the possible solution of straightening the newly erected objects.