

**Abstract of doctoral thesis dissertation by
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entitled: „Geological, mining and technical aspects to ensure the reactor
leakproofness design for the underground coal gasification”**

The doctoral dissertation concerns the issues of ensuring leakproofness of underground coal gasification cavity. The studies raises issues related to the evolution of geotermo-mechanical phenomena around the operated reactor. The main aim of the PhD thesis was to assess the impact of the technological process of coal gasification on the rock mass. To achieve this goal, the data available from different sources, reports from conducted experiments, , author's own considerations and calculations as well as review of literature were used. The obtained data were used to perform computer simulations and to construct the numerical models. The created models were employed to indicate the ranges and intensity of the violation of the rock mass surrounding the georeactor.

Due to the task complexity and lack of specialized software available for direct assessment of the phenomena occurring during underground gasification, the whole dissertation was based on the Phase 2 program, with the I independently developed by the author and implemented ' method of assessing the impact of heat on the properties of the rocks and the nature of its spread in the rock mass. The dissertation presents a detailed objectives of the program and the practical implementation of assumptions. When considering the problems of stability of the cavity and the georeactor leakproofness which differ in many aspects from the phenomena occurring in the rock mass and accompanying the "conventional" technology, the comparison of the obtained results with the reference data was performed. Many variants of simulation comparing underground coal gasification and classic exploitation were carried out and the results were only partially included in the PhD thesis. In order to perform the analysis dedicated to the underground coal gasification two different approaches were used: full analysis (dividing the gasification process into several stages according to the width of the cavities), and so-called simplified analysis, consisting of the directly modeled cavity with the final target width. Critical discussion of the results was carried out. On the basis of created numerical models allowing to assess the ranges and intensity of the violation of the rock mass around the georeactor the appropriate conclusions were formulated. The developed model can serve as a source of information and basis for further analysis.

An attempt to apply the developed methodology for the experiment of underground coal gasification in the active "Wieczorek" colliery as well as the analysis of the usefulness of the considered accessible methods to assess the damage to the structure of the rock mass were described in the following part of dissertation. As a summary of the dissertation, the methodology was proposed to evaluate the selected location of georeactor, which must be part of the decision-making process for research projects and commercial exploitation of underground coal gasification system.