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Rockburst risk assessment based on seismic tomography and analytical modelling data – a case study

Abstract

In accordance with the formal regulations currently in force in Poland, the criteria for rockburst risk assessment with respect to coal deposits include the records of seismic events and their impacts, de-stressing of the entire seam or its parts and expert opinions of mine operation engineers. Effectiveness of the de-stressing can
be verified by geophysical test data whilst the expert opinions are mostly based on mathematical modelling using
specialist software or dedicated simulation algorithms. This study collates and synthesises the results of tests carried out in a seam section in a colliery within the Upper Silesia Coal Basin, obtained by the outlined methods. Geophysical survey results are interpreted basing on seismic tomography procedures utilising the geotomography techniques for velocity field reconstruction in data processing. For comparison, the stress state modelling data are provided, based on conventional engineering solutions applicable to mechanics of deformable media. The actual assessment of the rockburst hazard level is based on observations of distributions of the longitudinal wave velocity in relation to the actual value of the vertical component of stress concentration within the coal seam.