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Models for the prediction of rockburst indexes

In underground works engineering, rockburst is characterized by a violent explosion of a rock block causing a sudden rupture in the rock and is quite common at high depths and every year is responsible for many accidents worldwide. It is critical to understand the phenomenon of rockburst, focusing on the patterns of occurrence so these events can be avoided and/or managed saving costs and possibly lives. The failure mechanism of rockburst needs to be better understood. Laboratory experiments are undergoing at the Laboratory for Geomechanics and Deep Underground Engineering of Beijing. A large number of rockburst tests were performed and their information collected, stored in a database and analyzed. Data mining (multiple regression, artificial neural networks and support vector machines) techniques were applied to the database in order to develop predictive models for the rockburst maximum stress (σ_{RB}) and rockburst risk index (I_{RB}). These indexes are very important in rockburst prediction and characterization. The database was composed by 139 laboratory rockburst tests. The results for σ_{RB} emphasized the importance of the uniaxial compressive strength of the rock and the horizontal *in situ* stresses. All the developed models presented excellent results, however the model based on the support vector machines algorithm presents the best performance. The models developed for IRB presented excellent results when the artificial neural network algorithm was used. With the developed models it is possible to predict these parameters with high accuracy levels using data from the rock mass and specific project.

Biography

Luís Sousa has more than 40 years of engineering experience. He has an extensive international experience on a large range of projects. He is Full Professor at the University of Porto in Portugal and is multilingual. He has authored or co-authored over 20 books and hundreds of journal articles, presentations and reports. He was President of SKEC Engineering Consulting and is a Consultant for Laboratory of Deep Underground Engineering, Beijing and Consulting Engineer in Switzerland, China, Oman, and Portugal. He is now Professor at China University of Mining and Technology, Beijing, and Sichuan University, Chengdu, China.

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