报告题目： **基于煤岩力学特性的煤矿破岩新技术及巷道加固原理**

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摘 要： 如何提高破岩效率和控制围岩变形一直以来都是采矿与岩石力学界所关注的热点和难点。本报告从煤岩体“抗压不耐拉”易发生拉伸破坏的力学特性角度出发，建立挠度拱力学模型对煤岩体破坏机理和工作面煤体变形进行分析，提出利用拉应力破岩机理的“采内（割煤）放外（剥煤、放煤）”新型钻采工艺，研制新装备并将其应用到煤矿开采现场。实践表明该方法可大大提高采煤效率。同理，控制围岩失稳破坏的关键是增强围岩塑性区抵抗拉应力破坏的能力。基于斜角锚杆（索）加水平拉杆的锚拉结构加固裂隙岩体的力学分析，从防止煤岩体发生拉破坏的角度提出巷道围岩稳定性控制原理，建立煤矿井下裂隙顶板加固的桁架-锚杆索系统的分析设计方法，应用表明该方法对控制现场巷道围岩变形具有重要意义。

New Coal Breaking Technology and Roadway Reinforcement Theory based on the Mechanical Characteristics of Coal and Rock

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Abstract: How to improve the efficiency of coal rock breaking and control the deformation in the surrounding rock has always been among the challenging issues in the mining and rock mechanics area. Based on the mechanical characteristics of coal and rock mass which are more likely failed by tension, we establish the mechanical model of flexural arch to analyse the failure mechanism of coal and rock mass and the deformation of coal seam in working face. A new drilling and mining technology based on the tensile failure mechanism of “drilling inside and spalling outside mining (DISOM)” has been proposed, and a novel roadheader coal cutter is then developed. The application of DISOM on site shows that this method can greatly improve the efficiency of coal mining. Similarly, the key issue to prevent the instability of the surrounding rocks is to improve their resistance to tensile failure in the plastic zone. Based on the mechanical model of using inclined roof anchor cable and horizontal tie rod to reinforce the fractured rock mass, and from the perspective of preventing the tensile failure of coal seam and rock mass, a new theory for controlling the instability of surrounding rocks is proposed. Then, a new design method of using truss-anchor cable system to reinforced fractured roof in underground coal mine is suggested. It is shown that the present method can well control the deformations of the surrounding rocks.