论文

基于统一强度理论的条带煤柱设计

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摘要：

现有条带煤柱设计方法偏于保守，急需更合理有效的条带煤柱设计方法，以提高条带开采的煤炭采出率。基于统一强度理论，建立了合理考虑中间主应力影响的条带煤柱极限强度公式，进而将其应用于条带煤柱屈服宽度和留设宽度的解析计算，并与Wilson公式以及广义SMP准则的拓展结果进行比较，得出中间主应力、煤层黏聚力和内摩擦角的影响特性。研究结果表明：本文所得统一计算式是一系列有序解的集合，具有广泛的理论意义；中间主应力、煤层黏聚力和内摩擦角对条带煤柱设计影响显著，应充分考虑中间主应力效应和煤层强度参数变化；Wilson公式结果过于保守，广义SMP准则结果是本文统一强度理论结果的一个线性逼近。

关键词： 条带煤柱；统一强度理论；极限强度；屈服宽度；留设宽度

Design of strip coal pillar based on the unified strength theory

Abstract:

The existing design methods of strip coal pillar are conservative.Therefore a more rational and effective design method of strip coal pillar is needed to improve the coal recovery rate.Based on the unified strength theory(UST)，a formula of limit strength for strip coal pillar was derived，which can take intermediate principal stress into account rationally.Then，analytical solutions of yielding width and remained width for strip coal pillar were presented and compared with the extended results of Wilson formula and generalized SMP criterion.Finally，parametric studies were discussed.The results show that the unified formula of limit strength，yielding width and remained width for strip coal pillar obtained in this paper is a series of results and has very broad theoretical values；the effects of intermediate principal stress and strength parameters(cohesion and inner friction angle)of coal seam on the strip coal pillar design are significant and should be fully considered；the result of Wilson formula is too conservative and the result of generalized SMP criterion is a linear approximation of the unified formula.

Keywords: strip coal pillar；unified strength theory(UST)；limit strength；yielding width；remained width

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