Study on Damage Constitutive Model for Soft Rock Based on Lade-Duncan Strength Criterion (Postprint)

Authors: Jian Bingxi

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Abstract

To investigate the effect of damage thresholds on the damage mechanical properties of soft rock with natural defects, an expression for the soft rock damage threshold was derived based on damage threshold theory, combined with the modified Lade-Duncan strength criterion and elastic Hooke's law. A statistical damage constitutive model for soft rock was established using Weibull distribution theory and Lemaitre's strain equivalence theory, and its verification was performed through triaxial compression tests. The results show that: the soft rock damage threshold determined from the modified Lade-Duncan strength criterion and elastic Hooke's law is overly conservative, and natural defects significantly affect the axial strain of rock. After modifying the damage threshold using natural defects in rock as a correction variable, the damage evolution law, failure process description, and stress-strain evolution of soft rock better match reality, which verifies the scientific validity and rationality of the soft rock damage constitutive model in this study.

Full Text

The provided text appears to be corrupted and cannot be meaningfully translated. The content consists of encoding artifacts, garbled characters, and fragmented LaTeX placeholders rather than coherent Chinese academic prose. No discernible sentences, technical arguments, or structural sections exist to translate into fluent English.

If you have access to the original source document, please provide a clean extraction of the Chinese text, and I will produce a proper academic translation following all specified guidelines.

Note: Figure translations are in progress. See original paper for figures.