

鋼索網與彈簧併用於降低落石衝擊力的研究

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摘 要 本研究以試驗量測落石防護網降低落石動能的功能，防護網由方形鋼索網與四支彈簧組成，試驗以懸擺的近似球狀鋼筋混凝土體撞擊防護網，撞擊過程中使用攝影方法評估瞬間的撞擊速度及使用線形電位計量測彈簧長度變量與時間的關係，試驗獲得的數據應用理論公式計算撞擊的動能、彈簧力、及彈簧應變能。有限次數試驗的結果顯示落石防護網可相當程度的轉換撞擊物體之動能為彈簧應變能，而獲得落石撞擊物體之後動能大量減少的效益。撞擊動能轉換為彈簧應變能的百分比可能與落石的動能之大小或其它尚未確認的因素有關，試驗結果顯示速度比較快且質量大的撞擊所獲得的轉換百分比小於速度比較慢且質量小的轉換百分比。本研究充份肯定鋼索網及彈簧的併用具有降低落石動能減少災害的應用價值。

關鍵詞：落石、落石防護網、動能、應變能。

The Alleviation of Impact Force of Rockfall Using a Wire-Rope Catch Net and Springs

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ABSTRACT In this paper, the results of tests for the evaluation of the function of a rockfall catching net are presented. The rockfall catching net is composed of a wire-rope catch net and four springs which are anchored to a frame. The wire-rope catch net was struck by a spherical-shaped swing mass of reinforced concrete in the test. The speed of the reinforced concrete mass prior to its crashing into the wire-rope catch net was estimated by using photography technique. While crashing the extension or contraction of four springs were measured along with time by using linear wire potentiometers. The kinetic energy of reinforced concrete mass and spring forces, as well as strain energy of the springs, were calculated in accordance with appropriate theoretical formulas. The results of limited tests appear that the rockfall catching net can transfer part of the kinetic energy of the reinforced concrete mass into strain energy of the springs. The amount of energy transferred seems to be related to the size of kinetic energy, though there might be some unidentified factors involved. The percentage of energy transferring from kinetic energy into strain energy of springs is more for those tests with less kinetic energy than those of larger energy. The results of the tests verified the function of rockfall catching net in reducing the kinetic energy of rockfall.

Key Words: rockfall, rockfall catching net, kinetic energy, strain energy.

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