



Experiments on pocket-type rockfall protective nets at a real slope

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Summary

Although pocket-type rockfall protective nets are more economical and easier to install, the amount of rockfall energy they can absorb and the locations where they can be used are limited. Because of this, in recent years, a new rockfall protective net, which has built-in shock absorbers to prevent anchor rods from breaking and to absorb considerable rockfall energy due to their function, has been designed. This study was conducted to determine the effective range of implementation for a new pocket-type rockfall protective net, and to confirm the net's reaction and energy absorption capacity upon the introduction of rotational energy approximating the actual behavior of a rockfall.

Keywords: pocket-type rockfall protective net; impact test; real slope.

1. Introduction

Rockfall mitigation construction can be divided into two types: rockfall prevention construction, in which measures are taken to prevent rockfalls before they occur, and rockfall protection construction, in which measures are taken to catch and stop falling rocks and prevent them from falling further or divert them to the side [1]. In one type of rockfall protection construction called a pocket-type rockfall protective net, the face of the slope is covered with a wire netting that catches and stops falling rocks that enter from a gap at the top of the net. Due to its light weight and widely available construction materials, this type of net is low cost, easily installable, and is widely used in Japan. However, this type of net is only capable of protecting from rockfalls of relatively low energy (50 - 150 kJ), limiting the sites where it can be installed. In recent years, a new type of high-energy-absorption pocket-type rockfall protective net has been under development, with shock-absorbing devices embedded into its mechanical structure. Adoption of this new type of protective net will be possible after evaluating its rockfall protection performance and capability in handling rockfalls of rated energies through performance evaluation experiments and data analyses. In previous research [2], the authors have performed impact experiments with full-scale free-falling masses and verified the performance of the pocket-type rockfall protective nets equipped with two different types of shock-absorption devices. However, due to limitations imposed by the experiment site and experiment setup, the previous experiments were performed with a vertical fall direction, which is different from the real-world case, and did not consider rotational energy because the experiments were free-fall. These issues were left for future research. In this research, the rockfall trapping behaviour of the same types of nets was verified and energy absorption performance was evaluated for the case of rockfalls with rotational energy, through a full-scale impact experiment on a real slope. In addition, the experiments were performed with both the conventional type of zinc-coated low carbon steel wires wire netting (hereafter referred to as