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Research on reliability of steel roof structures subjected to snow loads at representative sites in China

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Abstract: An appropriate probabilistic description of snow loads are important in reliability analysis.

Probability distributions for annual maximum ground snow loads are studied in detail in this paper based on the samples of snow loads on the ground, which are simulated by a snowmelt model. Then, selection of probability distribution function and parameter estimation method for ground snow loads is found to have a great influence on reliability assessment results. The reliability of members of steel roof structures subjected to snow load at four representative sites in China are investigated. The reliability indices of studied roofs are found not to be enough to reach the target value 3.2. The possible reason is that characteristic value of snow loads on the ground specified in Chinese load code are not conservative and the partial factor 1.4 for snow loads on roofs is not enough. To ensure designed roofs subjected to extreme snow loads a target reliability index 3.2, large partial factors for snow load that varies with COV of ground snow loads are expected to be used.

Keywords: Reliability analysis; snowmelt model; roof structure; snow load

1 Introduction

Load and resistance factor design (LRFD) method has been widely used in building design. In LRFD method, structural safety is expected to achieve a targeted level by using different partial factors for resistance and different types of loads. However, the reliability of roof structures whose design is governed

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