Computational fluid dynamics simulation of snowdrift around buildings: Past achievements and future perspectives

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Computational fluid dynamics simulation of snowdrift around buildings: Past achievements and future perspectives

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Abstract

This paper reviews the current status of computational fluid dynamics (CFD) modeling of snowdrift around buildings and discusses the review findings to give insight into future applications. First, an overview of past achievements in CFD simulations of snowdrift around buildings is provided by reviewing previous research. The history of model development is briefly outlined. Next, recent application examples are presented with respect to several topics, i.e., the application to practical design, consideration of meteorological influences and prediction of roof snow. Finally, the remaining development issues and new challenges are presented from an engineering viewpoint. Necessities of further model development, validation database, best practical guidelines and advanced analysis using CFD results are demonstrated. Clearly, CFD has considerable potential, as established in this review. However, to use it appropriately, sufficient attention should be paid to modeling theory and implementation. Because snowdrift is a highly complex phenomenon, we should not excessively rely on numerical simulation. It is important to use data from actual phenomena for all aspects of study.

1. Introduction

Under specific conditions of snowfall and wind, a large amount of snowdrift forms on and around buildings. Snow blown by incoming flow on the windward side of a flow obstacle can accumulate on the leeward side of the obstacle, where the wind velocity is sufficiently low allowing snow to settle out and form a drift. Therefore, snowdrift is formed as the result of the complicated