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Analysis of Wind Load Effect on the Roof of Low-Rise Building in the Mountain Terrain

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Keywords	Characteristics of Wind Field , Computation Fluid Dynamics (CFD) , Low-Rise Buildings , Mountain Terrain , Wind Load on Roof
Abstract	The wind conditions of the low-rise building in the mountain terrain are different because they have the characteristics of different landforms. When the typhoon comes, the possibility of structural damage is increasing by the negative effects of wind in the special topography. By establishing a sine function of outline of the hill, this paper makes a CFD(Computational Fluid Dynamics) numerical simulation about the low-rise building around the hills with four different height. Using ANSYS-CFX software as calculating platform, it put forward the roof wind load effect of the Low-rise building by study the characteristics of the hill, the law of wind pressure distribution and the influence to roof wind load by wind direction and the high of the hill, the conclusions which can provide a reference for wind-resistant design have practical significance.
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First page example

Analysis of wind load effect on the roof of low-rise building in the mountain Terrain`

Xingqian Peng , Linglin Shi

College of Civil Engineering, Huaqiao University, Xiamen, Fujian, 381021, China

Keywords: the mountain terrain, the low-rise building, wind load on roof, CFD, characteristics of wind field

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Introduction

Mountains are widely distributed in the typhoon-prone areas in China's southeast coastal provinces. Generally the low-rise housing in the complex mountain terrain are not paid enough attention in the design of wind-resistant ability. As they have different characteristics of landforms, the conditions of wind field vary. When the typhoon comes, the possibility of structural damage is increasing by the negative effects of wind in the special topography, easy to cause the serious personnel casualty and the economic loss^[1-3].

Li Guowei, etc. from Zhejiang University pointed out in the disaster's characteristic analysis of typhoon called "YUNNA" to the private residence, that in the typhoon disaster, the area which the private residence suffered injury was big, the scope was broad, creating huge economic loss. Although the quantity of low-rise housing located at mountain massif nearby is few, but the damage ratio is big, especially to two-floor housing. Viewed as a whole, its destruction often starts from superficial enclosure system, particularly from the destruction of roof system^[4-5]. Therefore, though the study of roof wind load of the low-rise housing in the mountain terrain, it's worth revealing the characteristics of wind field, the wind pressure distribution of roof, and the effects of wind directions and mountain altitudes to roof wind pressure, in order to guide engineering practice.

Calculation model and numerical simulation parameters setting

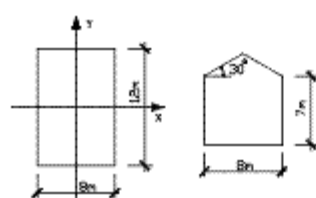


Fig.1 Low-rise housing geometry

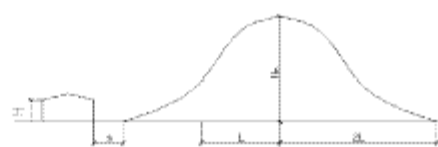


Fig.2 Computational model