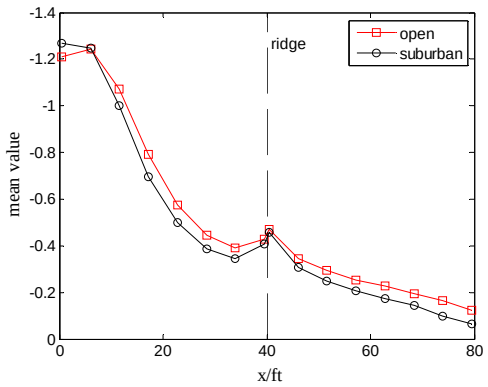
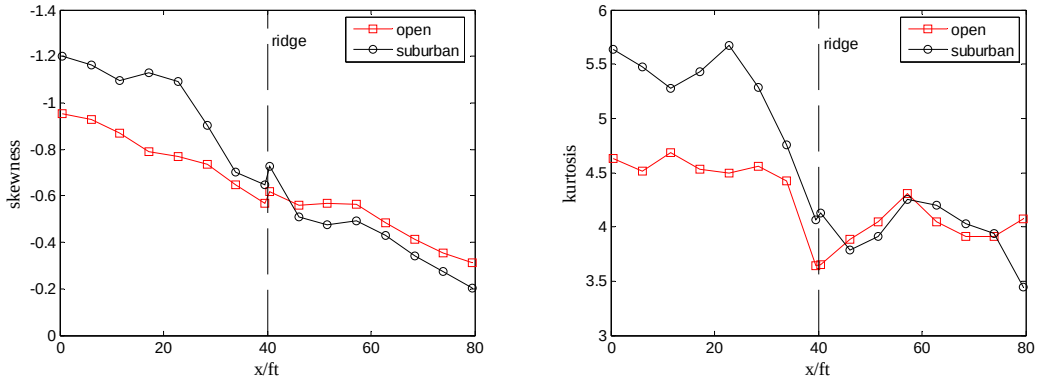


Fig. 10 Mean pressure coefficients for the taps at mid-span



(a) Skewnesses (b) Kurtosises

Fig. 11 Skewnesses (a) and kurtosises (b) of pressure coefficients for the taps at mid-span

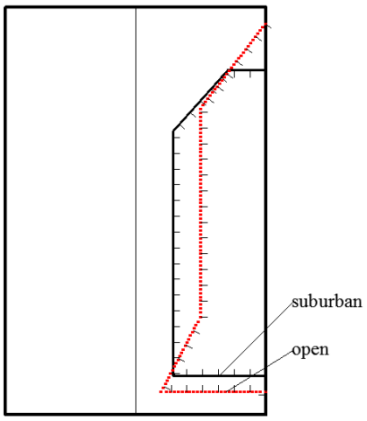


Fig. 12 Gaussian and non-Gaussian zones on the roof

1) As is shown in Figure 10, the absolute values of mean values are larger under the open terrain compared with those under the suburban terrain. However, the values are approximately close overall. At the same time, the absolute values of skewnesses and kurtosises at the windward are less when the building is under the open terrain. At the leeward the values of skewnesses and kurtosises for different exposures are similar.

The non-Gaussianity at the windward is weaker under the open terrain because of the weaker turbulence intensity. At the leeward, due to the separation of the flow near the ridge, the non-Gaussianity is alike under different exposures.

2) As is shown in Figure 11, the taps with smaller absolute values of skewnesses and kurtosises for both different exposures are located on the leeward. In Figure 12 the Gaussian zones are also located on the leeward for the two terrains and do not differ significantly.

Peak values of pressure coefficients for the taps at mid-span are depicted in Figure 13. As is shown in Figure 13, the change rule of the absolute values of peak values is similar with variation of skewnesses and kurtosises for the taps. It means that the absolute values of peak values at the windward under the open terrain are less than the counterparts under the suburban terrain. At the leeward, the peak values between the two terrains are similar. In view of the difference of the mean wind speed profile for different exposures, the roof height wind speed gained form the wind tunnel test is 8.53 m/s under the open terrain and 6.71 m/s under the suburban terrain, respectively. Once pressure coefficients are transformed into wind pressure using the wind speed of roof height, the absolute values of wind pressure are larger under the open terrain. It demonstrates peak values of wind pressure under different exposures are mainly relative with the mean wind speed. That is to say, the low-rise building under the open terrain suffers from the wind damages more easily than that under the suburban terrain.

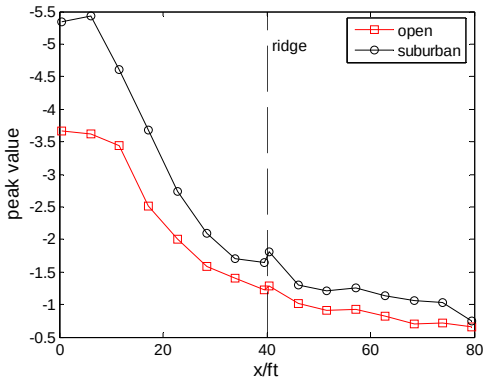


Fig. 13 Peak values of pressure coefficients for the taps at mid-span

4. CONCLUSIONS

Based on wind pressure characteristics of the gable roof of low-rise building under different roof slopes, building heights and exposures, the conclusion were summarized as follows.

1) In the case of buildings with a building height of 7.32 m, the suburban terrain and a wind direction of 270°, for the lower slopes (1/4:12 and 1:12), wind pressure characteristics on the roof are similar. The non-Gaussian zones located on the leeward are almost the same. So are the peak value curves. For the slope of 3:12, wind pressure characteristics have notable changes. The Gaussian zones transform to the windward near the ridge from the leeward. At the windward the absolute values of peak values of pressure coefficients decrease partly as a whole compared with those of the slower

slopes. For the slope of 6:12, the force at the windward changes from the suction to the pressure. At the same time, the absolute values of peak values at the windward decrease obviously. Besides, the leading edge of the windward is Gaussian nearly. The observations illustrate the separation of the flow does not happen at once at the leading edge for the slope.

2) In the case of buildings with a roof slope of 1:12, the suburban terrain and a wind direction of 270°, the Gaussian zones for different building heights are all located on the leeward. As the height increases, the non-Gaussianity is enhanced slightly and the absolute values of peak values of pressure coefficients increase slowly.

3) In the case of buildings with a roof slope of 1:12, building height of 7.32 m and a wind direction of 270°, the Gaussian zones which are located on the leeward are similar. The absolute values of peak values of pressure coefficients at the windward under the open terrain are smaller compared with the counterparts under the suburban terrain. At the leeward, peak values are alike for different exposures.

4) Peak values of pressure coefficients for the taps on the roof are connected with the non-Gaussianity. In general, the absolute values of peak values are larger for the position with the strong non-Gaussianity.

Acknowledgements

The support by “National 1000 Young Talents (China)” Program is greatly acknowledged.

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