Developing wind speed map for Oman

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Abstract

Recent trends in building constructions in Oman are more toward high-rise building projects. Hence, a better estimation of the lateral loading in the design process is becoming the focal of a safe and cost effective building industry. The aim of this research is to develop a wind speed map for design of building structure in Oman and analyze a typical building for different wind speeds.

This study is mostly based on the records of more than 34 years of measured wind speed data collected from 16 stations throughout Oman from the Meteorology Department. Statistical analysis using Gumbel and Gringo ten methods were used to predict the basic wind speed for various return periods of 50, 100, 500 and 1000 years, from which wind speed map for Oman are developed. The analysis of wind speed showed that the country can be divided into seven wind speeds zones, 15, 17, 18, 20, 21, 23 and 25 m/s. Basic wind speeds that do not exactly fit in any established zone should be assigned to the nearest higher level zone.

Typical building heights of 80m were used to compare the external pressure between different wind speeds. For basic wind speed of 18 m/s, the external pressure is 0.37 kN/m² whereas for wind speed 20 m/s, 23 m/s and 25 m/s the external pressure is 0.44, 0.58 and 0.69 kN/m² respectively.

The findings of this research can be used as a guide for the design of buildings in Oman.