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Analysis Of Wind Distribution On A Short Building Located On The Wake Zone Of a High-rise Building Based On Their Distance In-between

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Abstract

Construction of high-rise buildings and the tendency to build elevated buildings, in general, has witnessed a surge in the past decades, which has further complicated the influence of adjacent structures on each other. The present paper investigates the impact of wind speed and pressure distribution on the downstream building and mutual space in- between, in tandem arrangement. To this end, four different case studies have been carried out, focusing on distance (Dr) ratio. Computational fluid dynamics (CFD) has also been implemented in order to numerically evaluate the interaction between wind and buildings. Furthermore, a sensitivity analysis and the worst cases scenario simulation regarding the main factors influencing wind velocity and pressure distribution of the downstream building has been executed.

Key words: computational fluid dynamic (CFD); high-rise buildings; pressure distribution; wind velocity; downstream building.

1. Introduction

With the rapid growth of high-rise building constructions, complications concerning about the downstream building and mutual space in between has noticeably increased. Many researchers have investigated this matter (e.g. Ilgin et.al. 2007, Gu 2009, Feras et al. 2010, Blocken et al. 2015, Ramponi et al.

2015). However, these reports have mainly focused on the overall wind load effects and responsible conditions for collapses because of the shared space effects. The problems regarding high-rise buildings in limited site have rarely been the subject of research. Due to the sheltering phenomenon of the higher establishment, the adjacent structures have often faced low wind pressure and velocity complications.