

# Examining the pedestrian-level wind environment around high-rise buildings using CFD simulations. Effect of Height and Shape.

Abdelrahman Mohey<sup>1\*</sup>, Sherif A Ibrahim<sup>2</sup>, Hany M Abdel-Khalek<sup>3</sup>, Mohamed A Barakat<sup>4</sup>

<sup>1\*</sup> MSc. Researcher, Works Department, Egyptian Armed Forces Engineering Authority.

<sup>2</sup> Ass. Prof., Head of the Architectural Engineering Department, Military Technical College, Cairo Egypt.

<sup>3</sup> Lecturer, Architectural Engineering Department, Military Technical College, Cairo Egypt.

<sup>4</sup> Professor, Head of the Architectural Engineering Scientific Council, Military Technical College, Cairo Egypt.

\* Corresponding author's e-mail: abdelrhmanmohey98.41@gmail.com

**Abstract.** The environmental quality of living spaces is an important issue that affects the superiority of life and the satisfaction of their inhabitants. Several factors control and affect this issue, such as temperature, humidity, sound, visual comfort, and others. One of the important factors that severely affects the quality of urban environments is the wind speed effect, especially in those that are dominated by high-rise buildings.

Strong winds at a pedestrian level can endanger human safety, disrupt outdoor activities, and even damage properties. Studying the influence of the wind effects on the environmental quality is an important issue not only for the comfort of the dwellers but also for the pedestrian safety and the economic aspects of the location.

Several previous studies have explored and emphasized the importance of optimizing the urban design to mitigate adverse wind effects. These studies usually focused on the impact of the various building configurations and their effects on the pedestrian-level wind environments.

This paper spotlights the effects of building forms and heights on the wind behavior at the pedestrian levels. By proposing scenarios of a variety of deliberately suggested forms of building with ranged heights to examine and analyze, using the ANSYS Fluent software, the wind speed amplification and the wind speed-up areas around the buildings due to these scenarios, to achieve the best configurations that fulfill the urban comfort aspects.

**Keywords:** Wind comfort, pedestrian level, High-rise buildings, CFD simulation.

