Wind analysis of tall buildings using OpenFOAM CFD

Urbanization along with the rapid increase in demand for the house or any other structural needs with the decreased land availability to comply with such needs, the need for the construction of tall slender buildings often referred to as skyscrapers have drastically escalated. Therefore, for the sake of safe construction and durability of the building, it makes necessary for the designers to study all the affects of air and pressure on the buildings before the project begins. Therefore, an attempt is made in this project to study the effect of neighbouring tall buildings. An isolated rectangular building model has been considered as the based model in the analysis. An atmospheric boundary layer based wind profile has been adopted using a user defined function in the simulations.

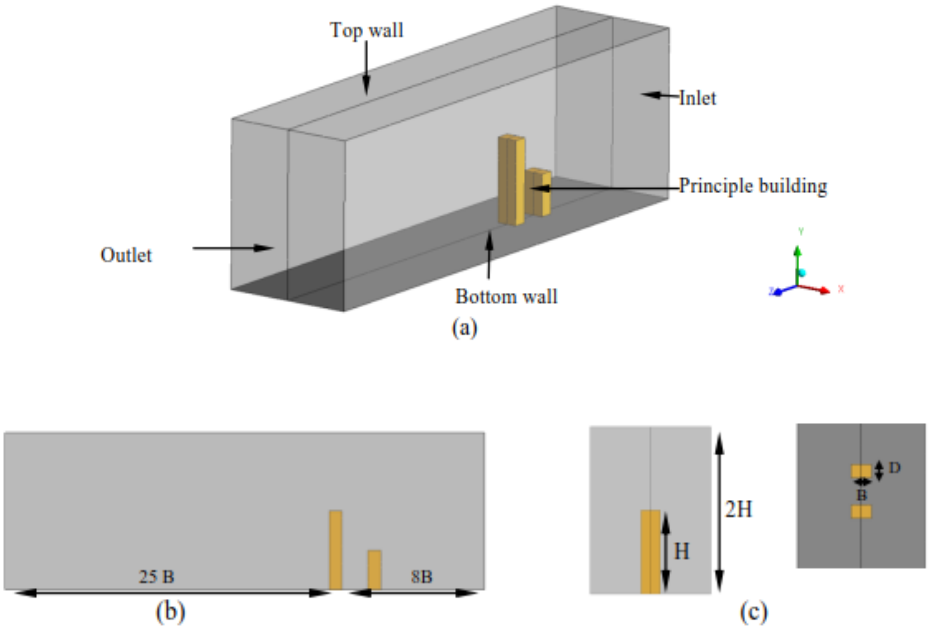

Fig.1: Geometry of the model and domain

Table 1: Cases for the wind flow analysis

CASES	PARTICULARS
1	Isolated building
2	Two building of same height in the vicinity
3	A building of height H/2 upwind of a building of height H
4	A building of height H/2 downwind of a building of height H

Specifications:

1. The building has a rectangular prismatic shape with dimensions 100 m (X) by 150 m (Y) by 600 m (Z) height representing a true scale building in an open terrain.
2. The flow is described in a Cartesian coordinate system (X, Y, Z), in which the Y-axis is aligned with the stream flow direction, the X-axis is in the perpendicular direction and the Z-axis is in the vertical direction.
3. Wind speed of 40 m/s is assumed at the inlet.