3.32 The Effect of Build Form: A CFD Analysis of Airflow and Ventilation Indices for Determining Openings’ Parameters

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The research conducted to achieve a substantial improvement, in understanding of airflow patterns, and natural ventilation indices, such as Air Change Rate ACH and Age of Air, and used the results as indicators for design optimization, the study conducted by utilization of Computational Fluid Dynamics (CFD) analysis, (CFD) is a recent technology that can be used to study and simulate the dynamics of air flow around and inside buildings, and offer detailed information other climatic elements affecting the airflow. Residential Buildings composing an urban cluster within a neighborhood scale, defined by the height of three plus one stories (12m) and building recess of 4m at the north and south directions, and 1.5m at the west and east directions, was subjected to the (CFD) analysis. Computational Fluid Dynamics (CFD) was able to visualize the outdoor and associated indoor flow patterns, and predict the mean flow rates and ventilation indices of Air Change Rate (ACR) and Age of Air, the results obtained from the indoor simulation conducted on different stories, combined by the outdoor simulation of the urban cluster, helped in determination of openings size, orientation, and indoor layout and distribution of spaces.