Dear Professor X.-L. Cheng,

We would like to appreciate for your careful reading and valuable comments. As you concerned, there are several problems that need to be addressed. According to your nice suggestions, we have made extensive corrections to our previous draft. Here are the point-to-point responses to your comments. Words in red are the changes we have made in the manuscript.

1. Line 60, please give the full name of TEB.

Response: TEB is the abbreviation of Town Energy Budget which is a urban canopy model developed by Masson in 2000 (Masson, 2000). The revised paper will make this clearer.

2. Eq. 3 σi is incorrect.

Response: We are really sorry for out careless mistakes. Thank you for your reminder. In our resubmitted manuscript, we have corrected σ_i into σ_k for representing the turbulent Prandtl number in k - ε equations.

3. In section 2, please give the boundary conditions.

Response: Thank you for your reminder. As you suggested, we will add a more specific description of boundary conditions in the revised paper. The wind speed in the inlet boundary is set as a constant of 0.1 m/s, 1 m/s and 8 m/s for different scenarios. The k (turbulent kinematic energy) and ε (turbulent dissipation) are determined by $k = 1.5(I\overline{u_0})^2$ and $\varepsilon = C_\mu^{3/4}k^{3/2}/l$ respectively where I represents the turbulent strength and l represents the turbulent characteristic length scale. The no-Slip boundary is applied in the ground and building walls. The other boundaries are all set to be zero-gradient.

4. In section 2.3.2, is "residence" or "resistance"?

Response: We feel sorry for our carelessness again. In our revised manuscript, we will correct “residence” into “resistance”.

5. In Figure 3-5, the symbols are not clear, some symbols overlap together and can not be

distinguished.

Response: We agree to your points. The normalized wind profiles from CFD simulation of 1 m/s and 8 m/s scenarios are so close at each representative position, which caused the sever overlap in these figures. Therefore, we remove the presentation of 1 m/s case in Figure 3-5 and changed the color, scatter points density and shape for better recognizability, as shown in Figure R1-R3. We add an explanation at Line 216 in revised paper: It is noted that the simulation results of 1 m/s and 8 m/s scenarios are very close after normalized by inflow speed, so the following figures only shows the inflow scenarios of 0.1 m/s and 8 m/s. The original results of wind profiles at different positions can be found in Zenodo links in Code and data availability section.

But the symbols in modified Figure R2c-d and Figure R3 also somewhat overlap. Figure R2 and figure R3 contains *v* component profile results of perpendicular and parallel scenarios respectively under different inflow conditions. For perpendicular scenario, the values of *v* component are relatively small due to the block of buildings in the middle part of street (Figure R2 c-d). For the higher levels of parallel scenario, the *v* component approach to the inflow wind speed so the values and variation are closed after normalization (Figure R3). We also add a more specific description for Figure R3 of perpendicular scenario profile results in revised paper: The results of *u* component show convergence in the entrance because of waking flows from building blocking while relatively small values at the middle and the exit. Due to the lack of blocking effects to *v* component in parallel scenarios, the value of *v* component is higher and increase rapidly with height at lower levels in street canyon, which is obvious at the entrance. As reaching to the half of building height, the increasing rate is much smaller and gradually approach to the inflow speed.

In addition, the original and processed data are all public. The original CFD simulation setting files and result data are public at Zenodo links https://doi.org/10.5281/zenodo.7371305 and https://doi.org/10.5281/zenodo.7371804 for perpendicular scenarios and parallel scenarios respectively. The normalized data for figure 3-5 can also be downloaded from Zenodo links https://doi.org/10.5281/zenodo.7372523, which can repeat the presented figures in the manuscript.

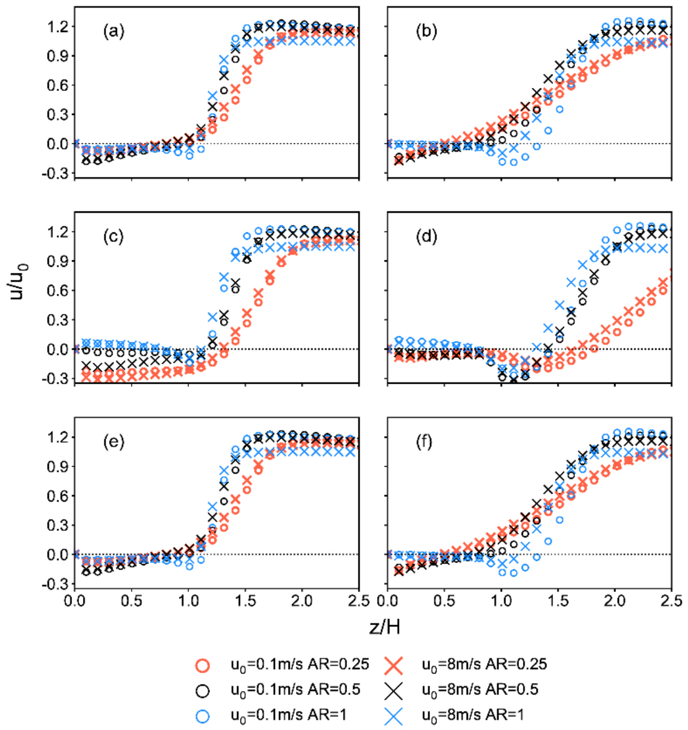

Figure R1 Modified Figure 3 for u component vertical profiles of perpendicular scenarios.

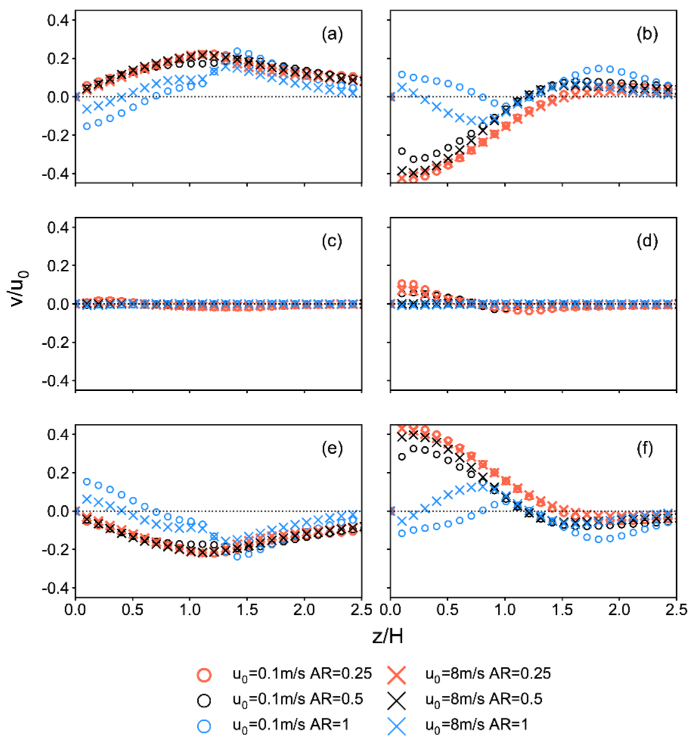

Figure R2 Modified Figure 4 for v component vertical profiles of perpendicular scenarios.

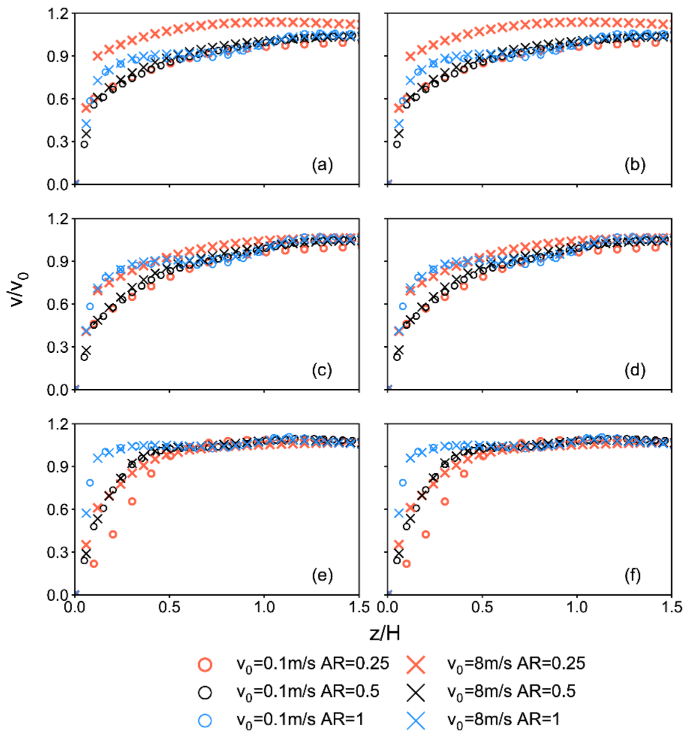

Figure R3 Modified Figure 5 for v component vertical profiles of parallel scenarios.

6. In section 3.1, the simulation results should be tested by observation results.

Response: The CFD configurations in our study are commonly used in urban street micro-scale simulations which is validated by wind tunnel experiments (Hertwig et al., 2012; Ai and Mak, 2017, 2018; Huang et al., 2019; Mirzaei, 2021). Besides, it is really hard to conduct measurement experiments under all scenarios we need for IWSUS's development. The most feasible method is that we obtain wind field observation data in street canyons with specific characteristics (such as HWR or AR), and based on the corresponding CFD street canyon model, we continue set the similar scenarios to obtain simulation results and to prove the consistent of the CFD simulation and the observation. Then, more background wind directions, HWR and AR scenarios are set in the CFD model to obtain the corresponding wind field in the street canyon. Finally, based on these CFD simulation results and the limited but very important observed wind field data, the wind field scheme in IWSUS is constructed. The aforementioned work is presented in the section 4 of the this manuscript. The results show that the wind profile derived from IWSUS is more consistent with the observation, which can also demonstrate the CFD simulation is reliable.

7. Section 3.2 is very confusing, why the expressions of ur (or vr) with AR are given, not ur (or vr) with hr?

Response: We apologize for our confusing expressions in section 3.2. The expressions of ur (or vr) with AR are given in order to determine the segmentation points of piecewise profile functions. The two parameters, normalized height (hr) and normalized wind speed (ur or vr) of every segmentation point, are needed, and only vary with AR. Therefore, these mathematical expressions are needed. Then, the type of function for every piece at different heterogeneous representative positions are specified according to the variation style, and the coefficients in these specified functions are solved by substituting the heights and wind component values at segmentation points in both ends of the piece. Finally, the expressions of wind profiles are obtained, which is also the expressions of ur (or vr) with hr as concerned.

We will add the red words above, the mathematical expressions between ur (or vr) and hr, and their determine functions for coefficients under perpendicular scenarios in revised manuscript and under parallel scenarios in the revised supplement materials.

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