Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

Validating computational predictions of night-time ventilation in Stanford's Y2E2 building[1] CHEN CHEN, GIACOMO LAMBERTI, CATHERINE GORLE, Stanford University — Natural ventilation can significantly reduce building energy consumption, but robust design is a challenging task. We previously presented predictions of natural ventilation performance in Stanford's Y2E2 building using two models with different levels of fidelity, embedded in an uncertainty quantification framework to identify the dominant uncertain parameters and predict quantified confidence intervals. The results showed a slightly high cooling rate for the volume-averaged temperature, and the initial thermal mass temperature and window discharge coefficients were found to have an important influence on the results. To further investigate the potential role of these parameters on the observed discrepancies, the current study is performing additional measurements in the Y2E2 building. Wall temperatures are recorded throughout the nightflush using thermocouples; flow rates through windows are measured using hotwires; and spatial variability in the air temperature is explored. The measured wall temperatures are found the be within the range of our model assumptions, and the measured velocities agree reasonably well with our CFD predications. Considerable local variations in the indoor air temperature have been recorded, largely explaining the discrepancies in our earlier validation study. Future work will therefore focus on a local validation of the CFD results with the measurements.

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Date submitted: 01 Aug 2017 Electronic form version 1.4