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**Full-scale validation of natural ventilation models using uncertainty quantification**[1] CHEN CHEN, CATHERINE GORL, Stanford Univ —
Natural ventilation can significantly reduce building energy consumption, but the flow rates and corresponding cooling depend on highly variable weather and building operating conditions. To support robust design of natural ventilation systems, we need computational models with uncertainty quantification (UQ) that can account for this variability. The objective of the present study is to perform full-scale validation of natural ventilation models in Stanfords Y2E2 building. Computational fluid dynamics (CFD) and UQ have been used to design the experiment and identify optimal temperature sensor locations under uncertain boundary and initial conditions. The resulting measurements are representative of the volume-averaged temperature, while also characterizing spatial variability in the temperature field.Validation of two models with different levels of fidelity will be considered. First, we will compare the measurements to predictions obtained with the CFD model. Second, we will validate predictions obtained with a fast, low-fidelity building thermal model, and investigate if surrogate models for the flow rates and heat transfer coefficients obtained from CFD can improve the thermal model accuracy.

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