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Using Magnetic Resonance Imaging (MRI) to Investigate Scalar Contaminant Dispersion in an Urban Environment JOSEPH CYMERMAN, Stanford University — Research in the past few decades on the dispersion of a scalar contaminant through an urban environment, with testing occurring in multiple cities worldwide, has mostly relied on point measurement systems. These models, which are strongly affected by the orientation of the buildings and environmental conditions, obtain relatively few data points and fail to achieve a robust understanding of the complex flow fields from an experimental perspective. A time-averaged MRI-based experimental measurement of the complete three-dimensional flow field has analyzed an array of buildings at two orientations in fully turbulent flow. The Reynolds number and upstream development match a series of tests conducted by both the ARL Atmospheric Sciences Branch and the Los Alamos National Laboratory for comparison, with several million measurements of each of the three components of the mean velocity across the full field. The water-based experimental measurements allow for the assessment of the geometric dispersion of the streamlines and a comparison with several computational models as a means of validation.

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