

Abstract Submitted
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A Method for Improving Magnetic Resonance Concentration Measurements Using Low Flip-Angle and Multiple Concentrations¹ IAN E. GUNADY, Princeton University, ANDREW J. BANKO, Stanford University, MICHAEL J. BENSON, United States Military Academy, CHRISTOPHER J. ELKINS, JOHN K. EATON, Stanford University — Understanding the dispersion of a scalar contaminant through an urban environment has many applications. Magnetic Resonance Concentration (MRC) can be used to measure the 3D mean concentration field. However, the uncertainty of the previous technique is approximately 5% of the injected concentration, limiting the lowest measurable concentration. In the present study, a scalar contaminant release from a discrete building mounted on the wall in a square duct flow is studied. After injection from windows in the building, the scalar disperses in the turbulent building wake. The concentration field is reconstructed from low flip-angle (30 degrees) MRC data that uses multiple concentrations of contrast agent to capture the near and far fields separately. A region of overlap in the linear range of the signal magnitude and scalar concentration relationship is used to stitch two fields together. This technique lowers the noise floor helping to reduce the uncertainty to less than 1%, allowing for previously unobservable near-zero concentration measurements near the wall. MRC data taken at low flip-angle are validated against data collected in the same flow with the established method which uses a flip-angle of 55 degrees.

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