

Abstract Submitted
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Molecular candidates of MTV in air NICO DAM, Mechanical Engineering Department, Eindhoven University of Technology, PO Box 513, 5600 MB Eindhoven, the Netherlands, MEHRNOOSH MIRZAEI, Institute for Molecules and Materials, Radboud University of Nijmegen, PO Box 9010/51. 6500 GL Nijmegen, the Netherlands, WILLEM VAN DE WATER, Physics Department, Eindhoven University of Technology, PO Box 513, 5600 MB Eindhoven, the Netherlands — In molecular tagging velocimetry (MTV), the molecules of a gas are used as flow tracers. These tracers can be produced at will by illumination with a laser which promotes molecules to a long-lived excited state, fuses N_2 and N_2 to NO, or makes molecules phosphoresce. A while later these tagged molecules can be visualized by laser-induced fluorescence, or by just watching them while they phosphoresce. Candidates for MTV in turbulence research must be arranged in structures narrower than the Kolmogorov scale, which remain narrow as time progresses, and must live longer than the Kolmogorov time. These requirements invalidate many candidates, candidates once deemed successful. They do so in various surprising manners that involve a combination of fluid flow and molecular dynamics. Rather than velocimetry in turbulence, MTV techniques offer a unique view on basic dispersion processes at the smallest scales of turbulence. In this way we have measured the spreading of clouds whose size is a few times the Kolmogorov length and the Batchelor dispersion of objects whose size is inside the inertial range.

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