

Abstract Submitted
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Design Feasibility Study of Whole-Field Pressure Measurements in Gas Flows: Molecular Tagging Manometry (MTM)¹ M.M. KOOCHESFAHANI, R. BASU, A.M. NAGUIB, Michigan State University — We present the theoretical foundation, implementation framework and experimental demonstration of a new diagnostic technique for non-intrusive, whole-field measurement of pressure within gasses. The new technique, which is referred to as Molecular Tagging Manometry (MTM), relies on oxygen quenching of phosphorescence emission from photo-excited tracers in oxygen-containing gases. As the pressure increases, the density of oxygen becomes larger, leading to a shorter emission lifetime: a working principle that is similar to pressure sensitive paint (PSP) but applied within the body of the flow. Using an experimental apparatus that is built around a pressure vessel, the viability of MTM is demonstrated for the first time using acetone as a tracer.

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