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Velocity, correlation time and diffusivity measurements in highly turbulent gas flow by an MRI method ZHI YANG, BEN NEWLING, UNB MRI Centre, University of New Brunswick — We present non-invasive, quantitative MRI wind-tunnel measurements in flowing gas (velocity > 10 m/s) at high Reynolds numbers (Re $> 10^5$). Our measurement method is three-dimensional and has the potential for saving time over traditional pointwise techniques. The method is suitable for liquids and for gases. We demonstrate the use of the technique on different test sections (bluff obstruction, clark Y-wing and cylinder). The mean velocity of gas flowing past those sections has been measured. We also investigate methods to measure flow correlation times by changing the acquisition interval between excitation of the sample and detection of the signal. This may be accomplished by making separate measurements or by using a multiple-point acquisition method. A measurement of correlation time allows us to map turbulent diffusivity. The MRI data are compared with computational fluid dynamics.

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