Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

Purely Phase-Encoded Magnetic Resonance Mapping of Turbulence Anisotropy[1] BENEDICT NEWLING, AMY-RAE GAUTHIER, ALEXANDER ADAIR, Department of Physics, University of New Brunswick — The measurement of flow velocities much greater than 1 m/s can be a challenge for conventional magnetic resonance imaging (MRI) methods. Motion during the spatial encoding interval can lead to a variety of geometric and anemometric distortions. Purely phase-encoded MRI methods, such as SPRITE (single-point ramped imaging with T_1 enhancement) can employ a short encoding interval (hundreds of microseconds) for the time-averaged measurement of fast flows. The interval is not only short, but also constant, which saves SPRITE from artefacts caused by interfaces in multiphase flow. Most recently, we have been using SPRITE to measure mean-squared displacements in turbulent flow in order to quantify the anisotropy of velocity fluctuations. By analogy with diffusion tensor imaging, we measure the components of an eddy self-diffusivity tensor downstream of a Venturi constriction at Reynolds numbers on the order of 10^5.

[1]Work supported by the Natural Sciences and Engineering Research Council of Canada

Benedict Newling
Department of Physics, University of New Brunswick

Date submitted: 31 Jul 2019 Electronic form version 1.4