Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

Effect of background turbulence on the mixing of a passive scalar within a turbulent jet[1] ALEJANDRO PÉREZ ALVARADO, Department of Mechanical Engineering, McGill University, SUSAN GASKIN, Department of Civil Engineering and Applied Mechanics, McGill University, LAURENT MYDLARSKI, Department of Mechanical Engineering, McGill University — The vast majority of the research on turbulent jets has studied those emitted into quiescent (or laminar) backgrounds. Yet, most jets in environmental or engineering applications are emitted into turbulent backgrounds. It is therefore imperative to fully understand the underlying physics of jets emitted into turbulent environments. The present investigation builds on previous work (Khorsandi, Gaskin and Mydlarski, *J. Fluid Mech.*, 2013, which studied the effect of background turbulence on the velocity field of a turbulent jet) and examines the mixing of a (high-Schmidt-number) passive scalar within a turbulent jet that is emitted into a turbulent environment. A quasi-homogeneous and isotropic, zero-mean-flow turbulent background was generated by means of a random jet array. The concentration field within the turbulent jet was measured using planar laser induced fluorescence. We will present results pertaining to the evolution of the statistical moments of the scalar field, as well as its characteristic length, relative that of a jet emitted into a quiescent background, and as a function of the intensity of the background turbulence. The role of background turbulence on the jet entrainment mechanism will also be addressed.

[1]Support for this work was provided by NSERC.

Laurent Mydlarski
McGill University

Date submitted: 24 Jul 2014 Electronic form version 1.4