Abstract Submitted
for the DFD05 Meeting of
The American Physical Society

Mixing of two scalars in turbulent channel flow[1] ETIENNE COSTA-PATRY, LAURENT MYDLARSKI, Department of Mechanical Engineering, McGill University — When two (identical) scalars disperse from two distinct sources in the same turbulent flow, the scalar fluctuations are mixed and result in a combined variance. In general, this value is not the sum of the variances from the individual sources – the combined variance depends on the covariance between the two scalar fluctuations. Given that many common engineering problems involve the transport of more than one scalar, the mixing of two or more scalars in turbulent flows is therefore of interest. The mixing of multiple scalars emitted from concentrated sources in homogeneous, isotropic turbulence has been thoroughly studied [2]. However, since most engineering flows are inhomogeneous, it is also of interest to study the mixing of two scalars in fully-developed, high-aspect-ratio, turbulent channel flow – the simplest realization of an inhomogeneous, turbulent flow. In the present work, scalars (temperature in air) are emitted from concentrated sources by heating fine wires that traverse the channel. Using cold-wire thermometry to measure the two fluctuating scalar fields, various statistics pertaining to their correlation will be presented. The similarities and differences with homogeneous, isotropic turbulence will be emphasized.

[1]Support has been graciously provided by the NSERC and FQRNT.
[2]Warhaft, Z., 1984, *J. Fluid Mech.*, **144**, pp.363-387

Laurent Mydlarski
McGill University

Date submitted: 04 Aug 2005 Electronic form version 1.4