

Abstract Submitted
for the DFD10 Meeting of
The American Physical Society

Linking spectra and geometry in scalar fields MIHKEL KREE, Aix-Marseille Universite, IRPHE, JÉRÔME DUPLAT, Aix-Marseille Universite, IUSTI, EMMANUEL VILLERMAUX, Aix-Marseille Universite, IRPHE — The spectral signature of a turbulent scalar mixture is usually interpreted in terms of cascades, leading to decaying power laws either in the inertial range (the $-5/3$ slope), or in the viscous subrange (the -1 slope). An intermittent scalar field produced by an elongational velocity field, whatever it may be, also gives rise to a -1 power law. We study here the mixing and homogenization of a passive scalar injected from a point source by both confining it in a channel, or by letting it disperse freely. The resulting spatial field is a set of scalar blobs and voids, with well defined widths distributions. The corresponding power spectra are not pure power laws, and their shape is evolving in time. We will present a novel method for constructing the shape of the scalar power spectra solely based on the information contained in the size distributions of the contiguous regions scalar (the blobs) and the interlacing free space (the voids).

Emmanuel Villermaux
Aix-Marseille Universite, IRPHE

Date submitted: 29 Jul 2010

Electronic form version 1.4