Abstract Submitted
for the DFD15 Meeting of
The American Physical Society

A model for the effective/turbulent Lewis numbers in turbulent non-premixed flames NICHOLAS BURALI, GUILLAUME BLANQUART, Caltech — Turbulent mixing has a strong impact on the structure of turbulent premixed and non-premixed flames. Experimental results have highlighted that, with growing turbulence intensities, turbulent transport becomes gradually dominant over molecular mixing. As this occurs, the (average) turbulent flame structure transitions to that of a unity Lewis number unstretched flame. In the current work, this transition is characterized by developing an *a priori* model for the effective/turbulent species Lewis numbers in turbulent non-premixed flames. This model is developed from a Reynolds–averaged Navier–Stokes (RANS) formulation of the species and energy transport equations, and validated using existing experimental and numerical data. The results of this work provide a simple framework to estimate the Lewis numbers to be used in one-dimensional flame calculations for chemistry tabulation.

Nicholas Burali
Caltech

Date submitted: 30 Jul 2015 Electronic form version 1.4