Quenching of combustion by fluid flow

Alexander Kiselev
Dept. of Mathematics
University of Wisconsin Madison
480 Lincoln Dr.
Madison, WI 53706-1388, USA
kiselev@math.wisc.edu

Abstract

We review recent results on the influence of fluid motion on premixed reaction processes. The framework we discuss is the passive reaction-diffusion equation (or system) which is a widely used and mathematically rich model for many processes in nature. The main focus is on quenching, when the combined effect of flow and diffusion leads to the extinction of the flame. We discuss how this process depends on the geometry, intensity and dynamical properties of the flow. Mathematical techniques involved are PDE estimates, comparison principles for the solutions, and probability tools.