Meeting: 1001, Evanston, Illinois, SS 4A, Special Session on Fluid Dynamics, Diffusion and Reaction

1001-35-390 **Andrej Zlatos*** (andrej@math.wisc.edu), UW Mathematics, 480 Lincoln Dr., Madison, WI 53706. *Quenching and Propagation of Combustion Without Ignition Temperature Cutoff.*

We consider a reaction-diffusion-advection equation in the cylinder $\Omega = \mathbb{R} \times \mathbb{T}^m$, with combustion-type reaction term without ignition temperature cutoff, in the presence of a periodic fluid flow. We show that if the reaction decays as a power larger than 3 as $T \to 0$ and the initial datum is small, then the flame is extinguished — the solution *quenches*. If, on the other hand, the power of decay is smaller than 3 or initial datum is large, then quenching does not happen, and the burning region spreads linearly in time. This extends results of Aronson-Weinberger for the no-flow case. We also consider shear flows with large amplitude and show that if the reaction power-law decay is larger than 3 and the flow has only small plateaux (intervals where it is constant), then any compactly supported initial datum is quenched if the flow amplitude is large (which is not true if the power is smaller than 3 or if there is a large plateau). This extends results of Constantin-Kiselev-Ryzhik for combustion with ignition temperature cutoff. Our work also extends to the case $\Omega = \mathbb{R}^n \times \mathbb{T}^m$, when the critical power is $1 + 2/n$, as well as to certain non-periodic flows. (Received August 31, 2004)