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Gelfand type problem for jets: auto-ignition of laminar co-flow jets

Abstract

In this talk I will discuss a mathematical model for auto-ignition of laminar co-flow jets.

The model consists of a heat equation with discontinuous diffusion coefficient and a singular source term. It will be shown that solutions of the model blow up in finite time. The blow up of solution, in a framework of the model, corresponds to successful auto-ignition.

The blow up time depends on several geometric and physical parameters. I will discuss results regarding dependency of blow up time on these parameters and give explicit expression for auto-ignition time in several asymptotic regimes important for applications.