Cleveland State University
College of Science

# COLLOQUIUM

## Peter Gordon

## Dept. of Mathematical Sciences, Kent State Univ.

### Gelfand-type Problem for Turbulent Jets

### Friday September 27th at 3pm in RT 1516

*Bio*:  Prof. Gordon received his Ph.D. from St. Petersburg State University (Russia).  Currently he is an Associate Professor at Kent State University. Prof. Gordon's research interests are partial differential equations and applied analysis.

*Abstract*: In this talk I will discuss the model of auto-ignition (thermal explosion) of a free round reactive turbulent jet. This model falls into the general class of Gelfand-type problems and constitutes a boundary value problem for a certain semi-linear elliptic equation that depends on two parameters: $\alpha$ characterizing the flow rate and $\lambda$ (Frank-Kamentskii parameter) characterizing the strength of the reaction. Similar to the classical Gelfand problem, this equation admits a solution when the Frank-Kametskii parameter $\lambda$ does not exceed some critical value $\lambda^{\alpha}$ and admits no solutions for larger values of $\lambda$. I will discuss the sharp asymptotic behavior of the critical Frank-Kamenetskii parameter in the strong flow limit $\alpha \gg 1$. I will  also give a detailed description of the extremal solution (i.e., the solution corresponding to $\lambda^*$) in this regime. This is a joint work with Fedor Nazarov and Vitaly Moroz.

## Refreshments at 2:30pm in RT 1517