



Announcing

A Colloquium Presentation

March 6, 2006 at 2:00 pm

Southern Hall 303

at The University of Southern Mississippi

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**Title: Blow-up of Solutions for Parabolic Problems
due to a Concentrated Nonlinear Source**

Abstract:

Let q be a nonnegative real number, and T be a positive real number. We study the following degenerate semilinear parabolic first initial-boundary value problem:

$$\begin{aligned} x^q u_t(x,t) - u_{xx}(x,t) &= a^2 \delta(x-b) f(u(x,t)) \text{ for } 0 < x < 1, 0 < t \leq T, \\ u(x,0) &= \psi(x) \text{ for } 0 \leq x \leq 1, \\ u(0,t) = u(1,t) &= 0 \text{ for } 0 < t \leq T, \end{aligned}$$

where $\delta(x)$ is the Dirac delta function, and f and ψ are given functions. It is shown that it has a unique solution before a blow-up occurs, u blows up in a finite time, and the blow-up set consists of the single point b . To illustrate our main results, an example is given. A computational method is also given to determine the finite blow-up time. Extensions of the results to a nonlinear source of local and nonlocal features, and to its multi-dimensional version are discussed.

Further Information

Refreshments are served from 1:50pm until 2:00pm in Southern Hall 303. Further details and information about this and other departmental activities is available online at http://www.math.usm.edu/bulletin_board/.