

COLLOQUIUM  
CENTER FOR APPLIED MATHEMATICS AND SCIENCE  
DEPARTMENT OF MATHEMATICS  
UNIVERSITY OF WEST GEORGIA

1:00 PM, WEDNESDAY, SEPTEMBER 3, 2014, BOYD 306

Speaker: **Prof. Sergei Avdonin**  
**Department of Mathematics and Statistics Fairbanks**  
**Alaska**

Title: **SOURCE IDENTIFICATION FOR THE WAVE EQUATION ON GRAPHS**

Abstract:

In this talk we consider source identification problems for the wave equation:

$$u_{tt}(x, t) - u_{xx}(x, t) + q(x)u(x, t) = f(t)g(x), \quad 0 < x < l, \quad 0 < t < T;$$

with boundary and initial conditions

$$u(0, t) = u(l, t) = 0, \quad u(x, 0) = u_t(x, 0) = 0.$$

The coefficient  $q \in L^2(0, l)$  and function  $f \in H^1(0, T)$ ,  $f(0) \neq 0$ , are known and the problem is to find the function  $g \in L^2(0, l)$  from the observation  $u_x(0, t)$ ,  $t \in [0, T]$ . We propose a simple and efficient identification algorithm, the main advantage of which is its locality: to recover  $g(x)$ ,  $x \in [0, a]$ ,  $a \leq l$ , we use the observation on the interval  $t \in [0, a]$ . Our approach is based on control theoretic ideas. Locality of the method allows us to extend our approach to the wave equation on graphs (including graphs with cycles) and generalize the leaf peeling method proposed in (Avdonin S., Kurasov P. (2008) Inverse problems for quantum trees, *Inverse Problems and Imaging*, vol. 2, no. 1, pp. 1–21) for the wave equation on trees.

The talk is based on joint work with Serge Nicaise, University of Valenciennes, France.

All are welcome.