

1:00 PM, TUESDAY, APRIL 10, 2007, BOYD 302

Speaker: **Prof. Sergei Avdonin**, Department of Mathematics, University of Alaska, Fairbanks, Alaska

Title: **Boundary Control Approach to Inverse Problems**

In this talk we describe an approach to inverse problems (the so-called Boundary Control method) which is based on deep connections between controllability and identification problems and is applicable to a wide range of linear distributed systems.

As an example of the approach we consider the inverse problem for a graph. We suppose that the graph is a tree (i.e., it does not contain cycles), and on each edge the Schrödinger equation (with a variable potential) is defined. The Weyl matrix function is introduced through all but one boundary vertices. We prove that the Weyl matrix function uniquely determines the graph (its connectivity and the lengths of the edges together with potentials on them). If the connectivity of the graph is known, the lengths of the edges and potentials on them are uniquely determined by the diagonal terms of either the Weyl matrix function, the response operator or by the back scattering coefficients.

We also demonstrate effectiveness of the Boundary Control method on example of a classical problem of signal processing — the spectral estimation problem.

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