

1077-35-1501 **Sergei Avdonin*** (s.avdonin@alaska.edu), Department of Mathematics, UAF, Fairbanks, AK 99775-6660. *Boundary Control Approach to Inverse Problems on Graphs.*

The Boundary Control (BC) method is based on the deep connections between control theory for PDEs and inverse problems of mathematical physics and offers a powerful alternative to previous identification techniques based on spectral or scattering methods. It allows to give a unified exposition of the classical Gelfand–Levitan and Krein theories, and the recently proposed Simon and Remling approaches.

In this talk we describe applications of the BC method to inverse problems on graphs. Differential equations on graphs are used to describe many physical processes such as mechanical vibrations of multi-linked flexible structures usually composed of flexible beams or strings, propagation of electro-magnetic waves in networks of optical fibers, heat flow in a wire mesh, and also electron flow in quantum mechanical circuits.

We proposed a new version of the BC method which combines the spectral and dynamical approaches to inverse problems for PDEs on graphs and developed a constructive procedure for the recovery graph's parameters. This procedure is recursive – it allows recalculating the inverse data from the original graph to smaller graphs. Because of its recursive nature, this procedure may serve as a base for developing effective numerical algorithms. (Received September 20, 2011)