

# Eigenparameter dependent inverse Sturm-Liouville problems

Maeve L. McCarthy

Department of Mathematics and Statistics  
Murray State University

## Abstract

Numerical techniques for the inverse Sturm-Liouville problem with eigenparameter dependent boundary conditions will be discussed. We will show that the potential  $q$  in  $-u'' + qu = \lambda u, 0 \leq x \leq 1$  subject to boundary conditions  $u(0) = 0, (a\lambda + b)u(1) = (c\lambda + d)u'(1)$  can be reconstructed using finite spectral data. This problem is first approached through the usual Gel'fand-Levitan technique by solving an equivalent hyperbolic boundary value problem. We also consider a shooting method where the right endpoint boundary condition is used in conjunction with a quasi-Newton scheme to recover the unknown potential. This is joint work with William Rundell of Texas A&M University.