

# A Dual Optimization Approach for Inverse Quadratic Eigenvalue Problems with Partial Eigenstructure

Professor Zheng-Jian BAI

Department of Information and Computational Mathematics  
Xiamen University

## Abstract:

The inverse quadratic eigenvalue problem (IQEP) arises in the field of structural dynamics. It aims to find three symmetric matrices, known as the mass, the damping and the stiffness matrices, respectively such that they are closest to the given analytical matrices and satisfy the measured data. The difficulty of this problem lies in the fact that in applications the mass matrix should be positive definite and the stiffness matrix positive semidefinite. Based on an equivalent dual optimization version of the IQEP, we present a quadratically convergent Newton-type method. Our numerical experiments confirm the high efficiency of the proposed method.

*Keywords.* *Nonlinear optimization, inverse eigenvalue problem*

*AMS subject classifications.* *65F15, 65H17, 15A22, 90C30.*