

# Initial source recovery of the wave equation given internal boundary measurements

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We consider an optimization problem in function spaces with a hyperbolic partial differential equation as constraint with application Photoacoustic Tomography. Our goal is to identify the state variable at the initial time given some data on an internal boundary. We derive the KKT-system and show that the problem is well-posed, moreover, the involved constants are independent of the regularization parameter. This leads to robust preconditioning. A stable discretization technique is introduced, however, at the price of introducing a stabilization parameter. Finally, numerical results are shown