Determination of cracks in piezoelectric media by Newton-multilevel methods

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The identification of cracks in piezoelectric ceramics from boundary measurements is a both practically highly relevant and mathematically challenging problem. The resulting inverse problems are highly nonlinear and ill-posed. Hence, for their numerical solution, we propose to apply a combination of a regularizing multilevel discretization scheme with Newton's method that can be show to yield convergence and convergence rates under less restrictive conditions on the nonlinearity than other iterative regularization methods for nonlinear problems. Numerical tests with synthetic data illustrate the performance of the proposed methodology.