An inverse problem in elasticity

Akhtar A. Khan,
Department of Mathematical Sciences,
Michigan Technological University,
1400 Townsend Drive, Houghton, MI 49931-1295

In this talk I will discuss a simple inverse problem in elasticity. The talk will be focused on the issues such as: What is an inverse problem? What are the common approaches to solve an inverse problem? Why are inverse problems challenging? I will pose the inverse problem as an optimization problem and discuss several existing approaches. Numerical results will be given for the various approaches. Having established this background I will discuss some new results obtained by myself. Mainly I will show that the output least-squares approach for elliptic inverse problems, using a coefficient-dependent energy norm functional, results in a smooth, convex minimization problem. I will discuss several theoretical and numerical advantages of having a convex objective functional. The issue of dealing with the discontinuous coefficients will also be discussed.