
# THE FINITE ELEMENT METHOD WITH NEURAL NETWORKS TO RECONSTRUCT THE MECHANICAL PROPERTIES OF AN ELASTIC MEDIUM

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## ABSTRACT

In this work we investigate a mathematical model to reconstruct the mechanical properties of an elastic medium, for the optical coherence elastography imaging modality. To this end, we propose machine learning tools by exploring neural networks to solve the inverse problem of elastography. In our framework, we analyze the relative error between the exact function and the neural network for the case of noise free data and noisy data. The direct problem is used to define the cost function. Our algorithm updates the parameters combining the backpropagation technique with the ADAM optimizer to minimize a cost function that takes into account the error of using neural networks in the fully discretized scheme of the direct problem. We report several computational results using fabricated data with and without noise.

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