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Imaging in waveguides

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Abstract

We consider the inverse problem of locating targets in a waveguide, using sensor recordings of the acoustic pressure field. This inverse problem has applications in underwater acoustics, non-destructive testing and more.

We assume time-harmonic sources, and work in the frequency domain, where wave propagation in the waveguide is governed by the Helmholtz equation. We examine traditional imaging methods for locating the target, as well as a deep-learning approach to imaging, using convolutional neural networks.