A Bayesian filtering approach for inclusion detection with ultrasound reflection tomography

Gerald Steiner
, Graz University of Technology

Abstract

Ultrasound is frequently used in nondestructive material testing due to its high sensitivity to inhomogeneities like cracks and gas inclusions. Tomographic approaches have the potential to attain higher resolution in terms of defect location and shape compared to conventional B-mode imaging. However, when commonplace reconstruction algorithms are used, the limited number of transducers available in realistic measurement setups leads to blurring and the presence of artifacts in the reconstructed image. This paper presents a novel reconstruction algorithm for ultrasound reflection tomography of binary material distributions. A key component is the Bayesian filtering approach employing a parameterized model of material defects. It allows the incorporation of prior knowledge about the reconstruction problem. Blurring and artifacts are inherently eliminated, allowing for more reliable and accurate reconstruction results.