

Over the past few years, the use of ultrasonic arrays for nondestructive testing (NDT) applications has grown rapidly and led to use new algorithms of signal processing. The present paper's main objective is to improve the resolution of defect detection and make the detection process as fast and accurate as possible. This paper introduces a novel method to improve the resolution of ultrasonic phased array. The proposed method is based on the variational decomposition of signal and on a deconvolution method. To reduce the level of signal's noise, a method based on the variational mode decomposition (VMD) is used and to improve the resolution, a sparse deconvolution algorithm optimized using the majorization-minimization (MM) method is used. A simulation study has been carried out simulating a block of stainless steel containing several defects in different positions. Experimental tests were performed on a sample of stainless steel containing several defects. The obtained results show that the proposed method can improve the quality of ultrasonic data which enhances the localization of defects