MODELING AND DESIGNING A FULL BEAMFORMER FOR ACOUSTIC SENSING AND MEASUREMENT

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Abstract - Acoustic sensing is a viable approach for solving issues related to many applications, namely, biomedical, distance measurements, mechanical, health infrastructure monitoring, etc. It is generally sustainable and of no negative impact on the object under test. The use of acoustic sensing under beamforming technique is an important asset to be exploited, especially for the aforementioned applications. This paper illustrates a generalized approach of modeling and designing a full beamfomer using two specific classes: LCMP (Linear Constrained Minimum Power) beamformers that are used to overcome robustness limitations and MVDR (Minimum Variance Distortionless Response) beamformers. Any aspect of modeling and designing is always related to the DOA (Direction of Arrival). The obtained results are based on assumptions extracted from an actual case of constructed system.

Index terms: Acoustic sensing, Beamforming, Ultrasonic shape detection, DOA, Distance measurement, array of sensors, interference-to-noise ratio (INR), signal-to-noise ratio (SNR).