



# Design of Circular Differential Microphone Arrays (Springer Topics in Signal Processing)

*Jacob Benesty, Chen Jingdong, Israel Cohen*

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Recently, we proposed a completely novel and efficient way to design differential beamforming algorithms for linear microphone arrays. Thanks to this very flexible approach, any order of differential arrays can be designed. Moreover, they can be made robust against white noise amplification, which is the main inconvenience in these types of arrays. The other well-known problem with linear arrays is that electronic steering is not really feasible.

In this book, we extend all these fundamental ideas to circular microphone arrays and show that we can design small and compact differential arrays of any order that can be electronically steered in many different directions and offer a good degree of control of the white noise amplification problem, high directional gain, and frequency-independent response. We also present a number of practical examples, demonstrating that differential beamforming with circular microphone arrays is likely one of the best candidates for applications involving speech enhancement (i.e., noise reduction and dereverberation). Nearly all of the material presented is new and will be of great interest to engineers, students, and researchers working with microphone arrays and their applications in all types of telecommunications, security and surveillance contexts.

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