

## Proposal for a master thesis

### Investigation of two-dimensional interpolation techniques for robust two-dimensional polynomial beamformers

In many recording scenarios, spatial selectivity of the recording system is desired to attenuate interfering acoustic sources. Beamforming techniques are used to realize such a spatial filtering with arrays of typically omnidirectional microphones. Compared to using directional microphones this approach has the advantage that the resulting beam may be electronically steered towards the desired direction. With increasing spatial selectivity of the beams, the sensor noise of the microphones may also be amplified, resulting in an unwanted low white noise gain (WNG). Moreover, it is necessary that the beamformer has a distortionless response with respect to the signal of a desired source.

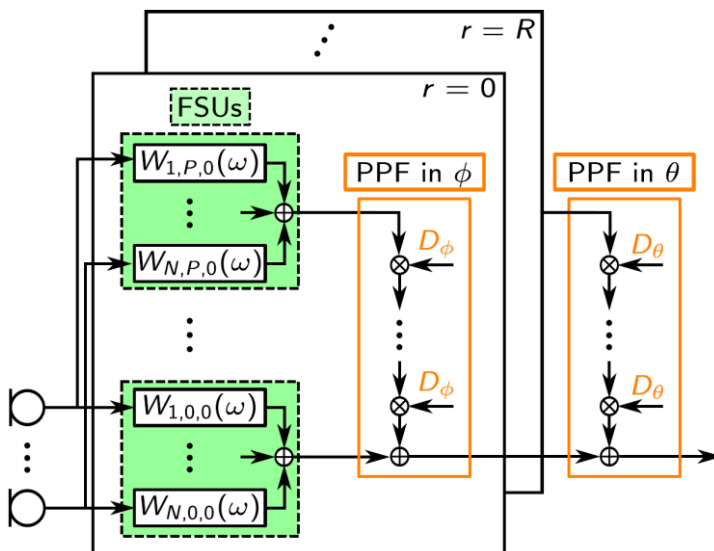


Figure: Block diagram of a two-dimensional polynomial beamformer.

Barfuss et al.<sup>1</sup> developed a robust two-dimensional polynomial beamformer design, which allows for a continuous steering of the main beam by choice of two single parameters. Here, the two-dimensional interpolation is split into two subsequent one-dimensional interpolation steps.

In this thesis, alternative interpolation approaches shall be investigated. This includes a thorough literature research regarding two-dimensional interpolation techniques, implementation thereof, and comparison of the new interpolation approaches to the one already used.

Implementation and evaluation are to be done using MATLAB. A well-structured and well-commented code has to be handed in at the end of the thesis. The thesis can be written in German or English.

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**Professor:** Prof. Dr.-Ing. Walter Kellermann  
**Prerequisites:** MATLAB programming, Course Digital Signal Processing  
**Available:** May 2018

<sup>1</sup> H. Barfuss, M. Bachmann, M. Buerger, M. Schneider, W. Kellermann, *Design of robust two-dimensional polynomial beamformers as a convex optimization problem with application to robot audition*, WASPAA 2017