

The interference between sound sources and the interference caused by noise and acoustic reflection can be collectively represented by $n'_1(k)$ in (15). When there is only interference between sound sources, CDM provides satisfactory positioning accuracy. However, CDM degrades positioning accuracy in realistic environments under low SNR or highly reflective conditions. TD-CDM can mitigate interference between sound sources to tolerate interference from noise and acoustic reflections and maintain short positioning time.

VI. CONCLUSION

This paper has presented the simultaneous multi-point measurement method using TD-CDM. We explained the signal model on the simultaneous multi-point measurement, where the source separation is mandatory to detect a distance and an AOA for every source. We compared TDM, CDM, and TD-CDM as multiplexing techniques and asserted that TD-CDM is effective from both sides of positioning accuracy and time. The effectiveness of TD-CDM was proven by the experimental and simulation results.

In our future work, we will investigate acoustic positioning systems when sound sources are moving. The countermeasure for Doppler shifts would be required for the above situation.

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Conflict of Interest

The authors have no conflict of interest to declare that is relevant to the content of this article.

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