

## A hybrid localization method for near and far-field acoustical sources

M.R. Rahimi<sup>1</sup>, H. Sadeghi<sup>\*2</sup>, A. Ghasemi<sup>3</sup>, M. Shamsi<sup>4</sup>

1. Faculty of Electronic and Computer Engineering, Shiraz University

2. Department of Electrical and Computer Engineering, Tarbiat Modares University

3. Department of Electrical and Computer Engineering, Kashan University

4. Department of Biomedical Engineering, Faculty of Electrical Engineering, Iran University of Science and Technology

### Abstract

This paper proposes a hybrid acoustical source-location finding method using the hyperbolic localization and cross-bearing intersection techniques. The method employs the time delays estimations (TDE) observed from multiple sensors in order to find the location of the acoustic source in the near or far-field. Since according to the existing literature, the conventional hyperbolic localization method does not provide enough accuracy for position-finding (PF), we propose that this method only be employed for obtaining TDEs. Then, using TDEs, the source position will be determined using the cross-bearing method. The simulation results show the significant improvement in source-position estimations as compared to traditional hyperbolic PF method. Furthermore, we also propose a method for accelerating the runtime of the optimization algorithm in the hybrid PF method.

**Keywords:** Localization, Acoustical sources, Direction of arrival, Cross bearing, Time delay estimations.

pp. 10-25 (In Persian)

---

\* Corresponding author E-mail: h.sadeghi.2015@ieee.org