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A boundary element method for near-field acoustical holography in bounded noisy environment

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This paper presents a boundary element method to recover free field conditions from noisy bounded space situations. The proposed approach is based on the Helmholtz integral formulation and requires the knowledge of double layer pressure fields on two parallel closed surfaces surrounding the source. First, the outgoing and ingoing pressure fields are separated. Then, the incident field scattered by the tested source is subtracted from the outgoing field to estimate the pressure field which would have been radiated in free field. The method had been numerically tested and an experimental example is given here. The source is a rectangular box with seven loudspeakers mounted on it driven by bandwith limited white noise. The source is put at 0.4 m from the ground of a semi-anechoïc room. The ground plays a disturbant role because it produces secondary sources. The results show the effectiveness of the method particularly at frequencies where stationary waves between the ground and the underside of the box exist.