Active room compensation for sound reinforcement using sound field separation techniques
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This work investigates how the sound field created by a sound reinforcement system can be controlled at low frequencies. An indoor control method is proposed which actively absorbs the sound incident on a reflecting boundary using an array of secondary sources. The sound field is separated into incident and reflected components by a microphone array close to the secondary sources, enabling the minimization of reflected components by means of optimal signals for the secondary sources. The method is purely feed-forward and assumes constant room conditions. Three different sound field separation techniques for the modeling of the reflections are investigated based on plane wave decomposition, equivalent sources, and the Spatial Fourier transform. Simulations and an experimental validation are presented, showing that the control method performs similarly well at enhancing low frequency responses with the three sound separation techniques. Resonances in the entire room are reduced, although the microphone array and secondary sources are confined to a small region close to the reflecting wall. Unlike previous control methods based on the creation of a plane wave sound field, the investigated method works in arbitrary room geometries and primary source positions.

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