

ACOUSTIC DIFFUSERS AND METADIFFUSERS IN ORCHESTRA PITS: THE GOOD, THE BAD, AND THE LOONY

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Abstract

Musical loudness in performing environments has recently become a subject of great interest in the entertainment sector. Indeed, recent evolution of health and safety concerns has created a plethora of new challenges for a broad range of activities. One of such is opera, and more specifically, the high sound levels originating from orchestra pits, generating musical discomfort and threatening the musicians' hearing. Whereas it is difficult and impractical to genuinely reduce orchestral sound levels by a significant margin, conventional counter-measures usually make use of acoustic absorption and diffusion to reduce the sound levels of certain frequencies as well as enhancing the performing parameters of musicians. However, orchestra pits are very limited on the amount of space available to apply any kind of traditional acoustic treatments and therefore require a more subversive approach in order to fine-tune the existing acoustic conditions into a more suitable performing environment for orchestra pit musicians. With the recent boom on metamaterial knowledge, it is possible – now more than ever – to create acoustic structures based on such science which allow for the mimicry of tailored acoustic effects (perfect absorption, phase-changing reflection, etc.) within a very restrained space. This will be leading to a discussion about (i) the effects of acoustic absorption and diffusion in orchestra pits, and (ii) the hypothetical suitability of metadiffusers to reproduce either or both acoustic phenomena within the constraint framework of opera productions, which in such case would help tackle the difficult acoustic conditions encountered in orchestra pits.