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Analog Feedback Control of an Active Sound Transmission Control Module

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Abstract This thesis provides analytical and experimental proof-of-concept for a new feedback-controlled sound transmission control module for use in an active segmented partition (ASP) array. The objective of such a module is to provide high transmission loss down to low audible frequencies while minimizing the overall mass of the module. This objective is accomplished in the new module by using actively controlled panels in conjunction with analog feedback controllers. The new module also overcomes two limitations that exist in current ASP modules: the inability to control broadband random-noise and the lack of bidirectional control through the module. Overcoming these limitations represents an important advancement in the research area of actively controlled partitions and broadens the number of potential applications for ASP arrays. Analogous circuit models were developed and used to predict the performance of the new ASP module under feedback control. The preliminary design consists of two loudspeaker drivers mounted back-to-back in a duct, with two decoupled analog feedback controllers connected to reduce the vibration of the loudspeaker paper. It was found that the classical analogue circuit model of a