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Multi-bay double panel system with heterogeneous blanket treatment: A comparison between theory and experiment

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This study is part of an effort to improve the low frequency performance of acoustic blankets used to reduce the noise inside aircraft cabins. This is achieved by embedding small masses inside the poro-elastic layer such that they act like distributed mass spring damper systems. These mass-spring-damper systems can then be designed to reduce the sound transmission through the double panel system at low frequencies where traditional poro-elastic materials have little effect. A mathematical model of a multi-bay double panel system with frames, stringers, an acoustic cavity and porous/mass layer was developed using impedance and mobility methods (IMM). The multi-bay double panel system includes four skin pockets with four HG blankets of different dimensions such that the interaction between the panels can be analyzed. The predicted responses of the source and receiver panel due to a point force are validated with experimental measurements. The results indicate that proper tuning of the mass insertions can improve the broadband noise reduction below 500Hz with less than 10% added mass without losing the performance of the acoustic foam at high frequencies.