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# Intelligent interfaces for sound insulation: Numerical and experimental optimisation

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Sound insulation is actually achieved thanks to passive multilayers. These ones are classically made of elastic, acoustic and poroelastic media. Good results are obtained in medium and high frequencies, but low frequencies disturbances still remain a problem. Indeed, local and global resonant behaviours of the panel, such as plate bending mode or the double-leaf phenomenon, occur and lower the performances. An active concept has already been proposed and validated. Piezoelectric components are added to the interface and act a secondary source aiming at minimising the sound transmitted. In this contribution, a double-plate system is studied. A reduced finite element model of an elementary cell is presented. This one relies on modal projection and classical component mode synthesis (CMS) procedures. This model is first updated and validated thanks to measurements performed on a dedicated test bench. The use of active control allows a 15 dB enhancement of sound insulation at low resonant frequencies. Numerical experiments are designed. Response surfaces are obtained thanks to kriging procedures. Finally, the configuration of the optimal interface is discussed in a physical point of view.