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Energy pumping in acoustics

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Energy pumping corresponds to a particular vibratory regime of a non-linear system coupled to a linear primary structure. Its non-linear behaviour allows to reduce vibrations of the primary structure, and is thus a new passive vibration control technique. This phenomenon has mainly been studied in mechanical engineering, so we transposed its principle to noise control in an acoustic medium. The presentation will focus on results about acoustic energy pumping that we observed both experimentally and numerically, in the time and frequency domains. These results highlight two main points : physically, energy pumping corresponds to an irreversible transfer of energy from the primary system to the non-linear absorber, and practically, its effects are a noise level limitation in the acoustic medium in permanent regime and a much faster sound extinction in transient regime.