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Project

Vibro-Acoustic Finite Element Simulation

Step 1: Original System

During this project, you will be asked to perform the analysis of a vibro-acoustic model. The system is similar to the one used in exercise session 6:

- An aluminum plate with dimensions 75cm by 40 cm and thickness 3mm is excited by a point load. The plate is simply supported on each of its edges.
- A cavity (filled with air) is connected to the plate on one of its side, the cavity's depth is 65cm.

Perform the vibro-acoustic response of this plate-cavity system.

- Compare the vibration of the plate with and without the presence of the cavity.
- Observe and comment the acoustic response at the microphone located inside the cavity.
- Observe the behavior (color maps and deformation) at the first few peaks.

Step 2: Treated System

It is then proposed to reduce the vibro-acoustic response of the system by using two independent solutions:

1. Higher damping coefficient for the plate
2. Porous elements in the cavity

Consider those two modifications independently from each other then jointly while proceeding as explained in the document:

Coupled_plate_cavity_damping_foam.pdf.

Required files are provided along the way. Compare both vibration and pressure responses of the three systems (original, high damping plate, porous in cavity).

Step 3: Variations

Perform variations on this system. Suggestions:

- boundary conditions (e.g. clamped vs. simply supported),
- material properties (air, temperature changes, pressure changes, water, ...),
- position and type of excitation,
- dimensions, ...