Vibroacoustic similitude laws for stiffened panels excited by a turbulent boundary layer

Summary

Xavier Plouseau-Guédé

The theories of similarity provide the conditions under which the state of a system A can be predicted by scaling the state of a system B whose properties (e.g. size, materials, loading conditions) are distinct from A. One possible interest in vibro-acoustics is geometric similarity, that is, scaling the vibro-acoustic behavior of large structures, by measurement on smaller structures. Here, the scale relationships between thickness, length and width of the structure are possibly different. The challenge is to ensure the simultaneous scaling of the different vibratory and acoustic spatial scales of the problem. The objective is to study the possibility of applying similitude laws for the acoustic radiation of stiffened flat panels excited by a boundary layer and coupled to a heavy fluid. The influence of the addition of stiffeners and the taking into account of the fluid-structure coupling will be studied separately, by analytical or numerical simulation approaches, to bring out exact or approximate similitude laws. Experiments will be carried out to verify the laws of geometric similarity on panels radiating in the air.