RUB

Master Thesis

Topic: Active Acoustic Noise Control of a Circular Cylindrical Panel Using Finite Element Approach

DESCRIPTION:

The available master project is concentrated on vibration and acoustic noise control of the cavity coupled circular cylindrical panel. The actuator is assumed to be piezoelectric patch and the sensor is assumed to be microphone integrated inside the cavity medium or another piezo-layer. The project has a systematic procedure, starting by modelling a finite length piezolaminated cylindrical panel which is coupled with light density acoustical domain by using finite element (FE) approach. Then the dynamic analysis of the system will be studied both in time and frequency domain under two input excitations: mechanical and electrical loading. Based on the obtained response, a linear model will be identified by using subspace identification method in frequency domain. Then, a simple discrete controller will be designed on the identified system and implemented on the full-order FE model by using UMAT subroutine. Finally, the efficiency of the designed system will be evaluated numerically. The application of the thesis is mainly in industrial gas containers.
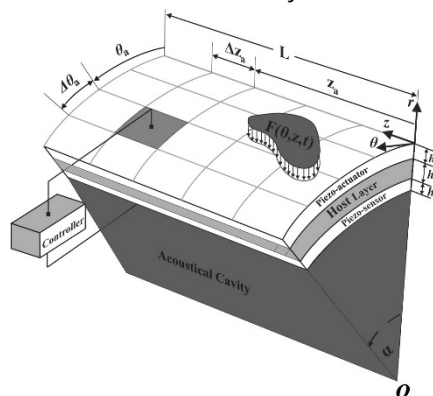

Figure 1. The acoustic enclosure coupled with a piezolaminated cylindrical panel

REQUIREMENTS:

Knowledge of vibrations of continuous systems, experience in scripting in ABAQUS.

REFERENCES:

[1] Gao et al., 2013, Active vibration control based on piezoelectric smart composite, *Smart Mater. Struct.,* Vol. **22**, 12p.

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