Vibration under flow

Component
École Nationale Supérieure d'Électrotechnique d'Électronique

In brief

Code ELP: N8EM06C

Presentation

Objectives

- Know how to identify the mechanism causing a vibration problem of a structure placed in a flow.
- Knowing how to choose the acquisition and processing parameters to identify the modes of an aeroelastic system by spectral analysis.

Description

I. Physics of the interaction

- Examples and industrial context, classification by dimensional analysis, aerodynamic complements.
- Vortex-induced vibration, lock-in
- Stability analysis, damping and added stiffness (galloping, divergence)
- Aeroelastic transients, dynamic stall, hereditary damping
- State formalism, modal analysis, antisymmetric stiffness coupling (flutter flexion-torsion of a wing).

II. Experimental identification

Non-contractual information.
Last update on 18 December 2024

- Periodic estimation of Welch, statistical properties
- Method of identification of fluidelastic coupling (direct or indirect)
- Filtering relations (Wiener-Lee), consistency function
- Practical application (TP) to spectral and correlation analysis "real time" of a flexible structure in a turbulent flow. Identification of a Movement Induced Vibration (MIV) coupling

Non-contractual information.
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