

SEMINÁRIO DE MECÂNICA

SLAT NOISE: ANALYSIS, NUMERICS AND EXPERIMENTS

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18/10/17

16:00 Horas

Auditório do MAT

Abstract.

Slat is a high lift devices placed at the leading edge of wings. It is an important noise generator and raises important environmental concerns. It is currently an active research topic. Wind-tunnel tests and numerical simulations indicate the spectrum of slat noise is dominated by low-frequency narrowband peaks at operational angle of attack. The research to be presented initiated by acoustic wind tunnel experiments with microphone arrays and beamforming techniques. A number of slat configurations was tested. Numerical simulations were then carried for selected cases and good agreement with acoustic results was obtained. Next, the numerical data were used to investigate the noise generation mechanisms. Coherent structures analysis with the Proper Orthogonal Decomposition technique revealed that the tonal peak frequency selection mechanism is associated with Kelvin-Helmholtz instability in combination with open cavity (Rossiter-like) modes. Linear Stability Theory was then used to explain how noise changes with angle of attack and slat configuration. Devices for noise reduction have also been developed.

