

DEVELOPMENT OF INSTRUMENTATION FOR THE CHARACTERIZATION OF FLUID / STRUCTURE INTERACTIONS

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ABSTRACT

This paper presents the experimental developments achieved during the campaigns dedicated to the understanding of the fluid / structure interactions in the UHBR composite fan ECL5. The fan has been designed and investigated at Ecole Centrale de Lyon. In order to decrease the uncertainties in the measurements some sensors and methodologies have been studied. Capacitive sensors for tip timing, stroboscope for high quality images acquisition together with (existing) high speed cameras have been developed to consolidated the database where the amplitude of blade variations as well as the aerodynamical features of the flow field are accurately described. In parallel the design and setup of microphones has been achieved in order to used hundred affordable microphones with the goal of characterizing the acoustic modes propagation.



**Figure 1. Instrumentation developed for the characterisation of NSV (Non-Synchronous-Vibration):
Microphone, capacitive sensor for tip timing and tip gap measurement, LED PCB for stroboscope
application.**