

# Stiffness measurement of viscoelastic materials against frequency using a piezoelectric actuator

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In aerospace, electronic devices are uncoupled from the structure in order to limit the undergone vibration levels. This is often done using viscoelastic materials such as silicone. The stiffness of such material is frequency dependent. The knowledge of its stiffness is required in large frequency band starting around 100Hz to 10000Hz in order to correctly predict the vibrations levels in response to a shock.

Above 1000Hz, classical measurement techniques are unable to directly characterize stiffness without the frequency-temperature equivalence. This equivalence requires time expensive tests. Indeed, in order to properly control the temperature, one has to wait until the sample temperature has stabilized in a heat chamber.

A viscoanalyser has been designed to avoid the use of the frequency-temperature equivalence, cf. Figure 1. It allows directly characterizing the shear and compression stiffness of preloaded viscoelastic materials between 100 and 8500Hz. The paper presents the design of this viscoanalyser, the postprocessing of the data and the measured stiffnesses of some samples.

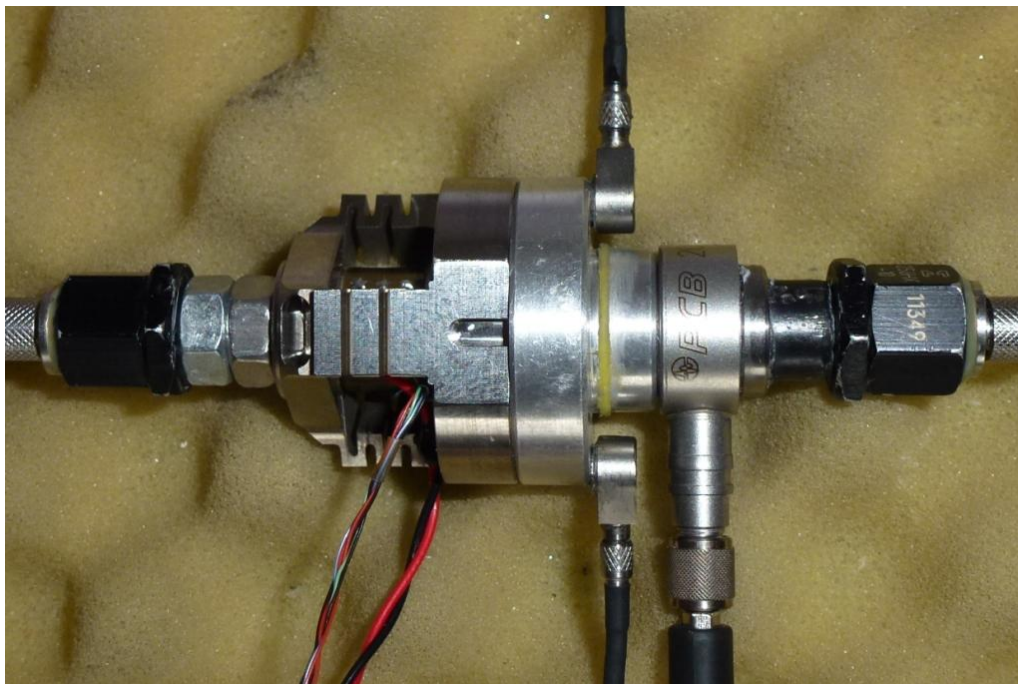


Figure 1: Picture of the viscoanalyser