Institute of Environmental Sciences and Technology

IEST-RP-DTE011.2

Design, Test, and Evaluation Division
Recommended Practice 011.2

Mechanical Shock and Vibration Accelerometer Selection

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1 SCOPE AND LIMITATION

The purpose of this Recommended Practice (RP) is to provide guidelines for selecting accelerometers to measure shock and vibration in laboratory and field testing environments. Many special applications are not covered (e.g., pyroshock [1,2], consumer products) because of their unique nature and the rapid advancements taking place in their disciplines. Even in applications not specifically addressed, however, these recommendations may be helpful.

There are basically two classes of motion sensors: fixed-reference and mass-spring (relative motion). Non-contact transducers, such as laser interferometric displacement and laser Doppler velocity transducers, are fixed-reference designs. Although they offer some unique properties, these instruments are used to measure shock and vibration only in applications where a fixed reference is available, and where their cost, size, and physical space and geometry requirements are acceptable. Similarly, video and high-speed photographic displacement measurement techniques are becoming more sophisticated, thereby increasingly allowing their application to the motion analysis of structures. These fixed-reference techniques, which have different constraints, are discussed elsewhere [3,4,5]. This RP concentrates on the more common mass-spring type accelerometers, with the sensing element(s) represented by the spring.

The following recommendations apply to dynamic measurements with frequencies ranging from DC (0 Hz) to more than 20 kHz. Only measurements of linear (translational) motion are considered; measurement of angular or rotational motion is addressed as an application at the end of the document.

2 REFERENCES

It is recommended that the user reference manufacturers' specification and application data in the selection and use of equipment. Please see Appendix A: Bibliography for informative resources.

3 TERMS AND DEFINITIONS

accelerometer
A transducer whose instantaneous output is proportional to the instantaneous acceleration input.

acoustic sensitivity
The rated output produced by a non-acoustic transducer in the presence of a specified acoustic field.

back-to-back comparison method
A method of performing a sensitivity/frequency response calibration of an accelerometer by mounting the unit under test to the sensitive surface of a reference standard and comparing the outputs of the two devices.

base strain sensitivity
The rated output produced by an accelerometer in the presence of a specified amount of strain input induced by the bending motion at the mounting interface.

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