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Author Cha-Hao Lin
Author's Email Address No Public.
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Abstract Abstract

Accelerometer is a vibration measurement instrument used for measuring the acceleration. The principle is using displacement sensor to record the seismic mass inside the accelerometer and the relative movement within the base. Presently, the displacement sensors use capacitive sensor, LVDT, piezoelectric sensor, and strain gage in the design. The accelerometers based on such displacement sensors are expensive and mostly imported.

To reduce the design cost of the accelerometer and improve the outcome of precision vibration measurement for higher application value, this study used optical displacement measuring probe, which is refined from the pickup head of the conventional DVD-ROM for the design of the displacement sensor. It also used the linear area of the S-curve measured by the pickup head to determine the seismic mass inside the accelerometer and the relative distance from the pickup head, in order to complete a single axial optical accelerometer of low cost and high sensitivity.

This study removed the focus lens of the original optical path design, and used four-quadrant photo detector to detect the offsets of the optical path, thus, to deduce the angle change of the surface and complete two degree-of-freedom probes. As for the structural design of the accelerometer, pendulum style design was adopted, thus, to develop internal seismic mass with dual axial movement, along with two degree-of-freedom probes to complete a dual axial optical accelerometer of low cost and high sensitivity.
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