

A new three-component optical accelerometer

This experimental study demonstrates a new three-component accelerometer that is based on the moiré technique. Our goal was to build an optical accelerometer whose performance is similar to that of seismic sensors yet can operate. The oscillation system of the sensor is a spring-suspended mass whose position is monitored by moiré technique. We used two similar overlaid gratings at a small angle that, one of them is fixed to the frame and the other one is attached to the suspended mass. The gratings are installed close to each other with no physical contact. Moiré pattern is illuminated with a 1 mW diode laser and its beam passes through the moiré pattern and a narrow slit and hits on a light detector. Due to a typical impulse and the fringes movements, the light intensity on the detector varies and is recorded as voltage. A digital signal processor samples the interference fringes signal and produces a 200 samples/sec record of the accelerometer output signals. Experiments to test this idea have been performed on our optical accelerometer and a calibrated accelerometer as a reference accelerometer in identical conditions. Investigations and Comparisons show that, our accelerometer is quite reliable and has some advantages.

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