Retrieving 3D Information for Probe Microscopy

A displacement sensor that employs an electromagnetic radiation source that generates a beam of electromagnetic radiation for measuring a feature of an object

Georgia Tech inventors have created a displacement sensor that employs an electromagnetic radiation source that generates a beam of electromagnetic radiation for measuring a feature of an object. The displacement sensor includes a displacement probe, a multi-dimensional diffraction grating, and a plurality of photon detectors. A reflection surface, which is changed when the probe interacts with the object, interacts with the beam from the electromagnetic radiation source and reflects a beam from the reflection surface. The multi-dimensional diffraction grating interacts with the reflected beam and generates a pattern of diffracted beams. Each photon detector senses a different diffracted beam, thereby providing information about the state of the probe.

Summary Bullets

- Can isolate the central region of a diffraction spot from its respective fringes
- Creates ideal diffraction patterns

Solution Advantages

- Can isolate the central region of a diffraction spot from its respective fringes
- Creates ideal diffraction patterns

Potential Commercial Applications

- Commercial probe microscopes

Background and More Information

Beam deflection is the most common detection method used in modern commercial probe microscopes because of its simplicity and versatility. Traditionally, beam deflection requires a force-sensing structure, probe tip, light source, and photodetector. A recent modification to the beam-deflection method is to insert a diffraction grating into the path of the beam and measure angular displacement of diffraction spots rather than angular displacement of the reflected incident beam.

Inventors

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Publications

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