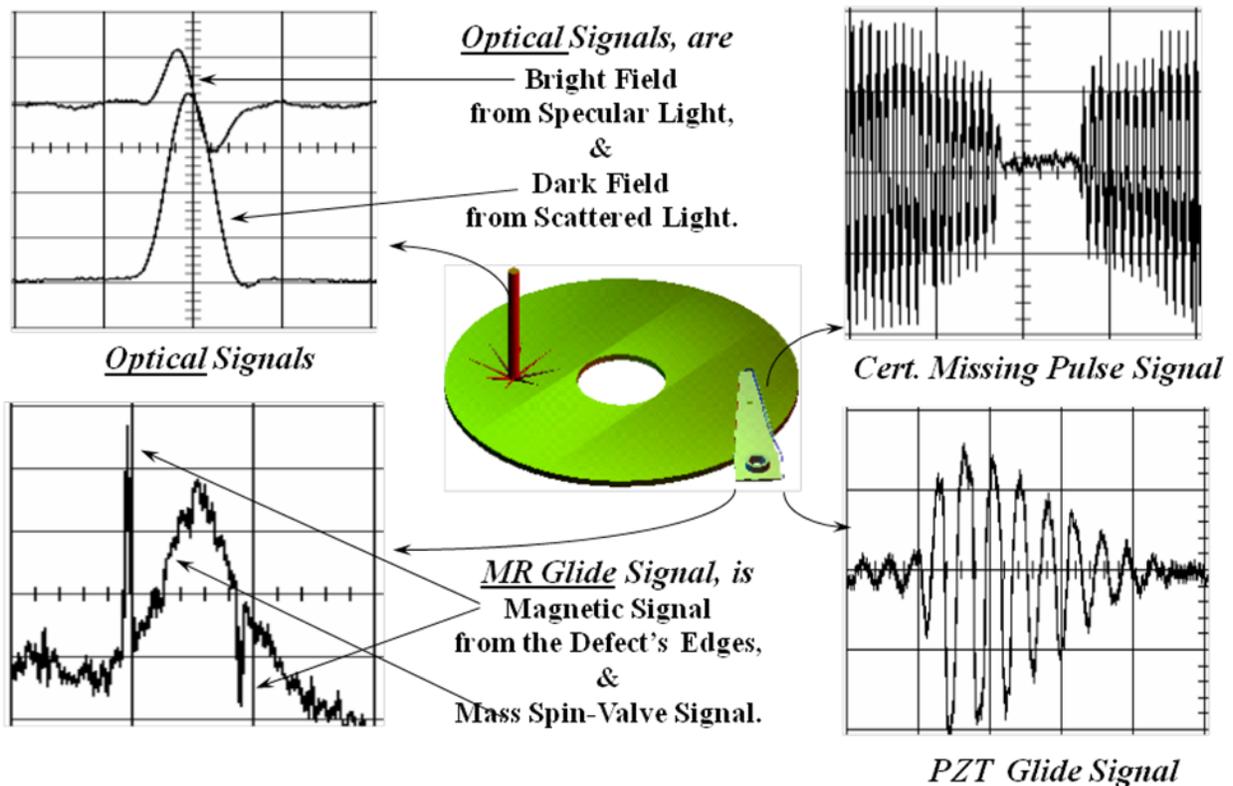


Defining Optical, Certification, PZT, & MR Glide Signals



Calibrated Device and Method to Detect Material Features on a Spinning Surface by Generation and Detection of Gravito-magnetic Energy

Patent US 9,318,031 B2--[0066] 1. Calibration Disk Standards for manufacturing purposes traceable to the National Institute of Standards and Technology requirements. Quality control for high density recording requires that the computer's hard disk surface be free of defects larger than $1\mu\text{m} \times 1\mu\text{m}$ in areal size or better. Current methods for characterizing defects of this size are limited by slow metrology techniques such as Atomic Force Microscopy (AFM), the associated Magnetic Force Microscopy (MFM), or faster techniques like Piezoelectric (PZT) Glide. Another faster defect detection technique that uses spin stands such as magnetic certification testers that detect missing pulses at high frequency write and read rates (i.e. Phase Metrics MG250 a type of hard disk certifier).

Continuation Application (A.)15/130,768 for Calibrated Device And Method to Detect Material Features on a Spinning Surface by Generation and Detection of Gravito-magnetic Energy

New Art-- The GMR gravitomagnetic method and device could replace the existing magnetic certification testers currently in use by the magnetic media industry to detect missing pulse errors at high frequency write and read rates in magnetic media. The head disk assembly (HDA) used to detect missing pulse errors can compromise read and write capabilities for data exchanges that exceed the reliability requirement of the head disk assembly in the hard drive manufacturing process currently in use. The invented device described herein replaces this "certifier" with one that can detect pits, in addition to

bumps, on the surface of the hard disk platter, as well as magnetic media defects, and can do so without high frequency write and read rates data recording, and the associated high frequency electronics necessary for certifying the disk platter's reliability using the current methodology.

The PZT gravitomagnetic method and device could replace the existing Piezoelectric (PZT) Glide head assembly used to detect bumps that compromise the reliability of the head disk assembly in the hard drive manufacturing processes. The invented device as described herein replaces these with a more efficient device and method that can detect pits in addition to bumps on the surface of the hard disk platter, and that can do so without contacting the spinning disk's surface.

The invented device is partially preferably characterized by its no-contact interaction with the disk platen, by its detection of pits and non-contact bumps, and National Institute of Standards and Technology ("NIST") traceable metrology techniques performed at disk drive speeds. These characteristics of the invented device provide increased yields and throughputs of disks without a loss of quality in the HDA manufacturing process.