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ment of the present invention. A grating is a periodic stepped structure having one or more interconnected parallel planes as shown, for example, in FIG. 5, and is disposed with respect to the magnetic sensor. The grating or gratings are disposed with respect to the magnetic sensor or magnetic sensors described in FIG. 20. A grating is disposed with respect to a magnetic sensor if the grating is in the magnetic sensor, on the magnetic sensor, or otherwise placed in relation to the magnetic sensor such that the grating influences the magnetization of the magnetic sensor or the response of the magnetic sensor to a magnetic field.

Horizontal axis 2000 shows the HF amplitude observed in a group of magnetic sensors on an anisotropic magneto-resistive read head where the magnetic sensors are provided with gratings. Vertical axis 2002 shows the percentage of magnetic sensors at a particular high frequency amplitude. Compared to the graph shown in FIG. 19, the overall high frequency amplitudes are shifted downwardly when gratings are provided on the magnetic sensors. More importantly, more magnetic sensors are clustered about a particular high frequency amplitude; that is, 1.1 mV. The more narrow distribution of high frequency amplitudes reflects a more stable bias point for each magnetic sensor.

The description of the present invention has been presented for purposes of illustration and description, and is not intended to be exhaustive or limited to the invention in the form disclosed. Many modifications and variations will be apparent to those of ordinary skill in the art. The embodiment was chosen and described in order to best explain the principles of the invention, the practical application, and to enable others of ordinary skill in the art to understand the invention

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for various embodiments with various modifications as are suited to the particular use contemplated.

What is claimed is:

1. A magnetic sensor comprising:

- a substrate;
- at least one lead disposed on the substrate;
- a directional, contact bearing surface magnetic sensor element disposed on the substrate and operably connected to the at least one lead, the magnetic sensor element having a zigzag shape maintained on a far side of the magnetic sensor element, a near side of the magnetic sensor element that comes in contact with a surface omitting the zigzag shape; and
- a grating in the form of a periodic stepped structure disposed with respect to the magnetic sensor element, wherein the grating is adapted to control asymmetry of a response of a magnetic field produced by the magnetic sensor element, and wherein the periodic stepped structure is maintained, in addition to the zigzag shape, on the far side of the magnetic sensor element, the near side of the magnetic sensor element omitting the periodic stepped structure.

2. The magnetic sensor of claim 1 wherein the grating is further adapted to control a bias point of the magnetic field produced by the magnetic sensor element.

3. The magnetic sensor of claim 1 further comprising:

- a data processing system operably connected to the at least one lead, said data processing system adapted to convert a magnetic field sensed by the magnetic sensor element into a datum representing the magnetic field.

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