Docket #: S21-158

Method to Measure Magnetic Field at AC Frequencies without Using Current Spinning

Researchers at Stanford have developed a Hall-effect sensing technique shown to be more accurate and cost effective than current spinning. The technique overcomes conventional limitations and has the advantage of measuring any magnetic field frequency, without consideration of phase-matching or frequency matching, enabling broad applications. For background, Hall-effect sensors are used to measure magnetic fields in a variety of applications, including electricity generation at power stations, electric motors, and power electronics. The diversity of applications has driven significant research in this area. But conventional Hall-effect devices are fundamentally limited by current spinning. Prior work by the inventors represented a major innovation in Hall-effect sensing, but the harmonic signal driving the device had to match exactly the frequency of the external magnetic field. **The novelty of the new method is that it does not require frequencies to have an exact match**. It leverages the AC Hall-effect to characterize a magnetic field at an unknown frequency (or frequencies). The resulting measurement of magnetic field spectral components is phase-independent and requires no prior knowledge of exact magnetic field frequency.

Stage of Development
The researchers have experimentally shown offset voltage values between 8 and 27 ?T at frequencies ranging from 100 Hz to 1 kHz, verifying the potential of their technique in both cases.

Applications

- Measuring AC magnetic fields
- Car manufacturing

- Power transformers and high power electricity lines
- OEMs

Advantages

- Can measure magnetic field at any frequency without current spinning
- Does not require matching frequencies
- Reduces components, overall cost and size of device
- Preserves accuracy and precision
- Produces no induced voltage and results in a low offset

Patents

- Published Application: 20220390532
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