

Multi-pass Magnetometer for Inherent Heading Error Reduction

Y. Rosenzweig^{1,2} and I. Shcherback¹

¹ Elta IAI, Israel

² Department of Physics, Ben-Gurion University of the Negev, Be'er Sheva, Israel

This work presents novel single beam U-shaped OPM with inherent Heading Error (HE) reduction.

Geomagnetic field magnetometers performance is affected by its orientation relative to Earth's magnetic field, mainly due to non-linear Zeeman effect which manifest as magnetic readout signal variations, i.e., heading error [1].

HE is symmetric with respect to circular polarization helicity; therefore, the common approach is to split the incoming beam into right – and left-hand polarized beams to self-compensate the HE effects [2]. In a single-beam multi-pass U-shaped implementation the incoming beam is reflected back to the vapor cell while keeping its helicity constant despite the propagation vector' reflection. This simple structure allows to achieve a cost-effective inherent HE reduction with a compact optical setup. The experimental results show more than an order of magnitude improvement in HE.

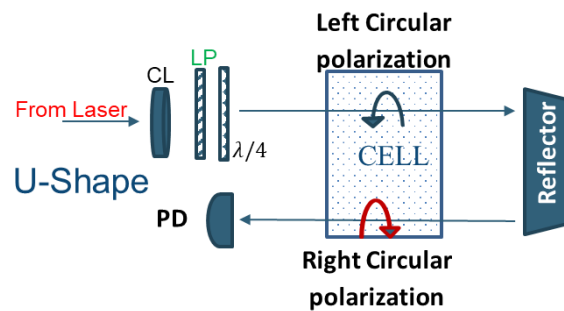


Figure 1: Sensor configuration: CL – collimating lens, LP- linear Polarizer, $\lambda/4$ – quarter waveplate, PD- photodiode.

References

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