The discovery of a new photoelectric medium based on experiments

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Abstract: The fiber optic gyroscopes is based on the Sagnac Effect, and the two lights propagating in different directions produce a phase difference when the fiber loop rotates. However, when the gyroscope is stationary, that is, the medium is stationary, the applied radial and axial magnetic field gyroscope will also produce a phase difference, and the phase difference is directly proportional to the magnetic field strength. At present, only the magneto-optic effects on the gyroscope are the Faraday Effect and the Cotton-Mouton Effect. In order to verify whether the axial magnetic field is the role of the above two magneto-optic effects, the fiber optic gyroscope is specially modified to let the two beams of light in the optical fiber propagate in the same direction, and then add the radial and axial magnetic fields to the fiber loop, that is, two experiments, B-1 and B-2. Through experiments, we first excluded the possibility of the Cotton-Mouton Effect. Two experiments, radial magnetic field A-1 and axial magnetic field A-2, were then performed in normal mode. Calculate acording to theory, the Faraday Effect of the A-1 experiment is at least 367 times higher than that of the A-2 experiment, but the experimental results are only 1.56-fold. Therefore, this abnormal experimental phenomenon is a major discovery. The phase difference produced by the axial magnetic field will not be caused by the Faraday Effect, and the existing theory cannot give a reasonable explanation to the abnormal experimental phenomenon, which also means that there must be an unknown photoelectric medium.

Key words: new photoelectric medium；magnetic field action of fiber optic gyroscope；Sagnac Effect

1. Experimental principle

As in Figure 1-1, the solenoid is arranged in concentric circles with the fiber loop. This photoelectric medium is driven by the electric current moving in the solenoid. According to the principle of speed superposition, the motion speed of this medium overlaps with the speed of light in the fiber loop, causing the speed difference in a different direction from the current.By adjusting the current size, the photodetector outputs different values. The output values conform to the following formula:

$S = kIL$

where S is the amount of change in the detector output value, K is the coefficient, I is the current and L is the length of the optical fibre (optical path), which is approximately equal to the length of the fibre. This means that the output value (number of moving stripes) is proportional to the amount of current in the solenoid and the length of the fibre.

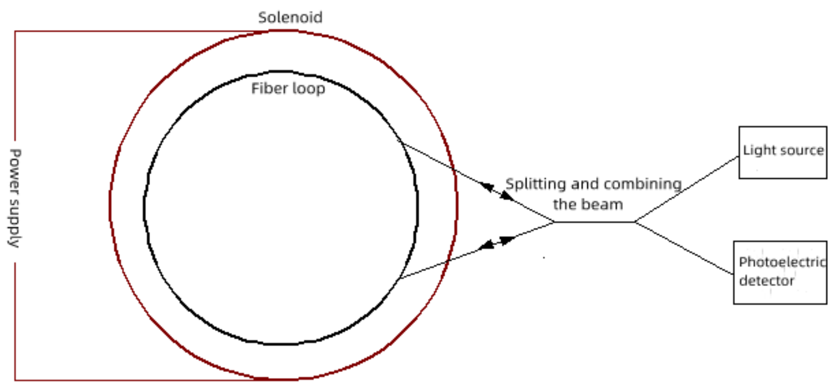

Figure 1-1

2. Experimental specific process and analysis

The experiment was modified with LKF-FS070 fiber optic gyroscope, and the experiment was divided into two groups A and B. In the picture coordinates, the horizontal axis represents the time, the vertical axis (left side) represents the angular velocity（°/h）, and the temperature curve is turned off

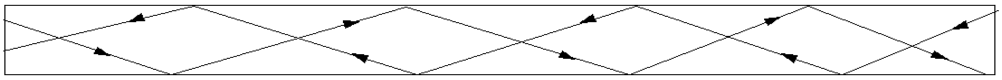

Figure 2-1

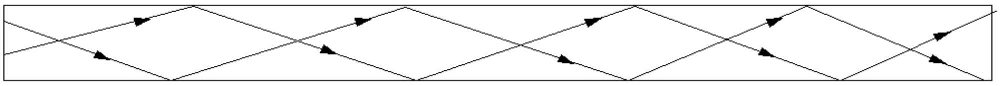

Figure 2-2

Group A experiment shows the axial (shown in Figure 1-1) and radial (shown in Figure 2-3) magnetic fields applied to the fibre loop when the two beams are in opposite directions (shown in Figure 2-1)

A-1 Radial magnetic field experimental results

Variation curve of the output value when the solenoid is switched on from -3 to 2A

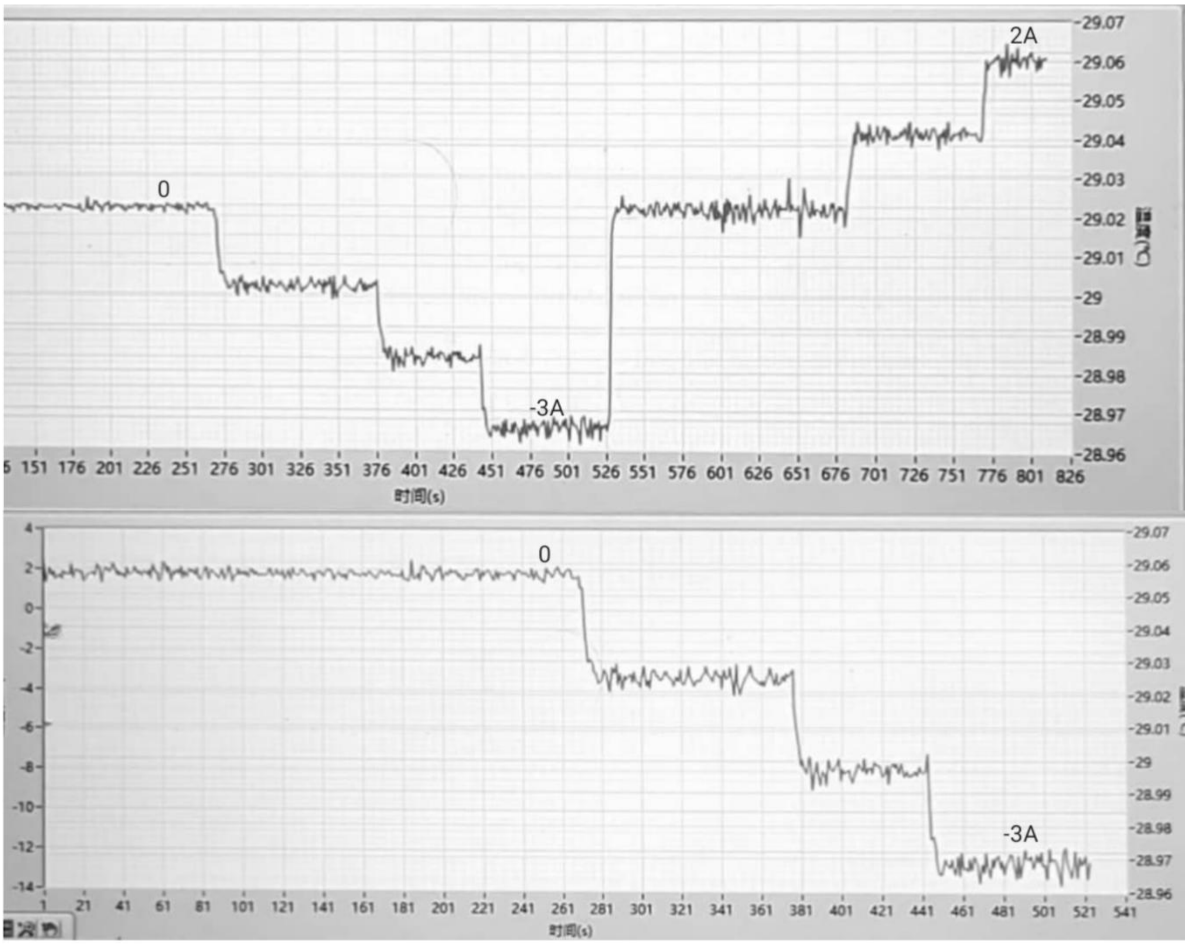

Figure A-1

A-2 Axial magnetic field test results

Variation curve of output value when the solenoid is switched on from -5 to 5A

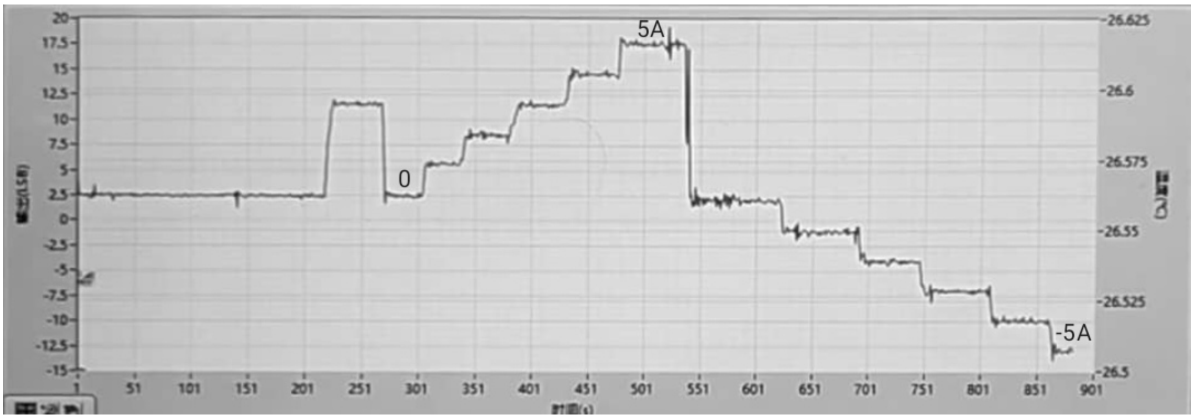

Figure A-2

Group B experiment shows the axial and radial magnetic fields applied to the fiber loop when the two beams are in the same direction (illustrated in Figure 2-2)

B-1 Radial magnetic field experimental results

Variation curve of the output value when the solenoid is switched on from 1 to 5A

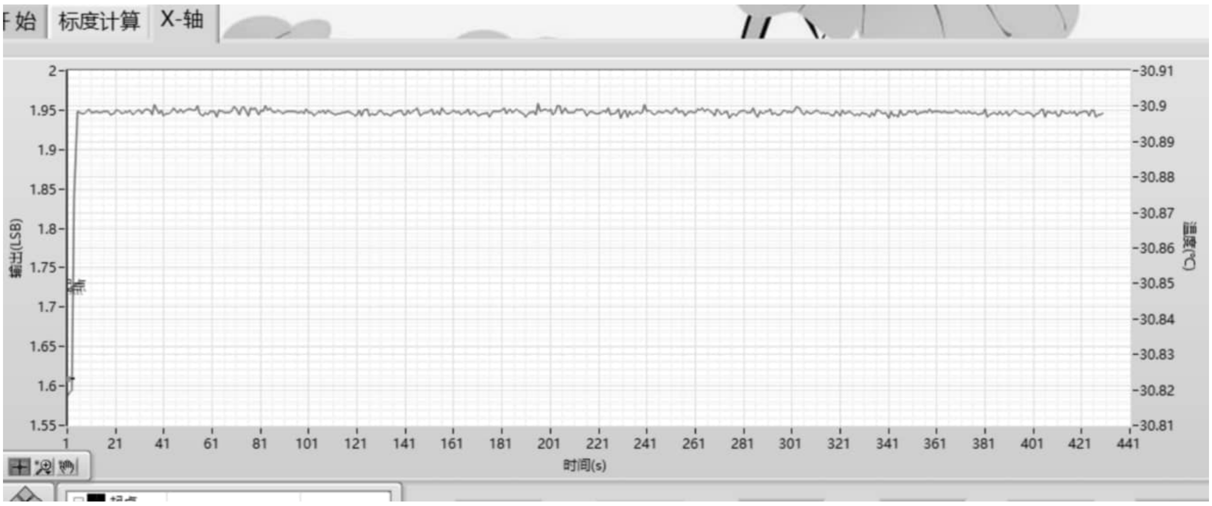

Figure B-1

B-2 Axial magnetic field experimental results

Variation curve of output value when the solenoid is switched on from 1 to 5A

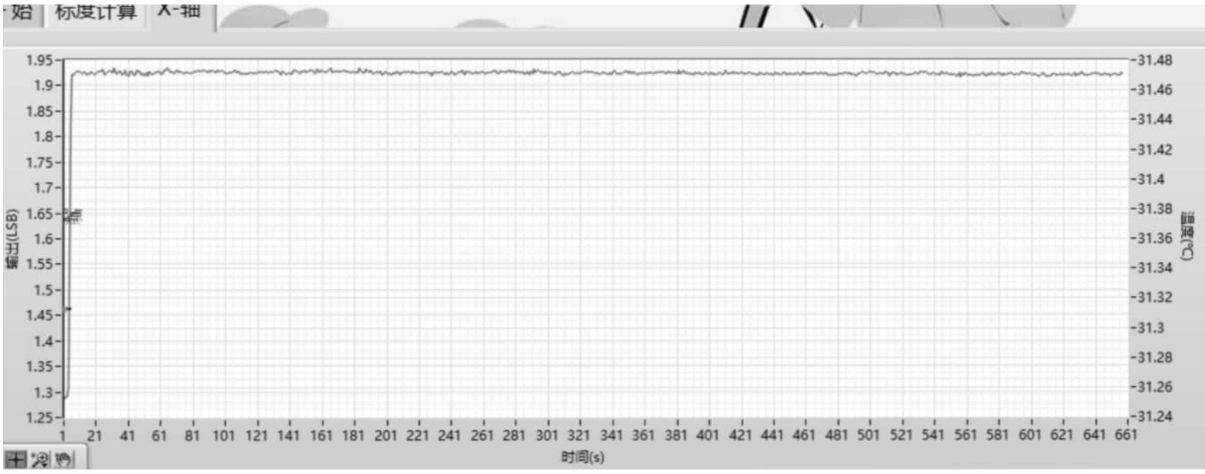

Figure B-2

2.1 Two factors that may cause optical fibre to exhibit non-reciprocity due to magnetic fields

(1) Non-reciprocity caused by the Cotton-Mouton Effect. An optical fibre is theoretically isotropic inside, but the fabrication of the fibre can result in more or less irregular shapes and twisting deformations during winding, causing internal stresses to be inconsistent and resulting in deflection of the polarized plane. Two beams of light are in the same fibre, but the paths are not identical. For these reasons, the polarized plane of the two beams of light in the fibre are not in the same direction, which means that the refractive indices of the different polarization direction are not the same when a perpendicular magnetic field is applied to the light. That is $\beta_x \neq \beta_y$.

(2) Non-reciprocity caused by the Faraday Effect. The light is rotated by the application of a parallel magnetic field, and the angle of deflection is given by the formula $\theta = vBL$. This property is only related to the material of the optical fibre and the length of the fibre, it has nothing to do with Cotton-Mouton Effect, fiber torsion, stress change and other factors. When two beams of light are different direction, one beam is left-handed and the other right-handed. The optical fibre have different phase constants for left and right spins $\beta_l \neq \beta_r$,

so the light propagates at different speeds in the different direction. This results in non-reciprocity, which is also the current mainstream explanation.

2.2 The possibility of non-reciprocity caused by the Cotton-Mouton Effect can be excluded by the experiment

In group B experiments, the two beams are in the same direction, and the Faraday Effect causes the two beams to rotate in the same direction, so there is zero effect on the experimental results. In contrast, the experiments in group B are all zero results, so the Cotton-Mouton Effect is also ruled out.

The specific reflection paths of the two beams are different and random in the fiber whether they is in the same or different direction. The change of the polarized plane of each beam is also random with equal probabilities. The Cotton-Mouton Effect is only related to the polarization direction of light perpendicular to the magnetic field, not to the direction of light propagation in the optical fiber, so the Cotton-Mouton Effect is equivalent in the two groups of AB experiments. Since the Cotton-Mouton Effect of Group B is excluded, the experiment of Group A can also be excluded from the Cotton-Mouton Effect.

2.3 The A-2 experimental results are not caused by the Faraday Effect

Because the Cotton-Mouton Effect is ruled out, the Faraday Effect alone does not cause the phenomena produced by experiments A-1 and A-2 at the same time, among the factors currently known.

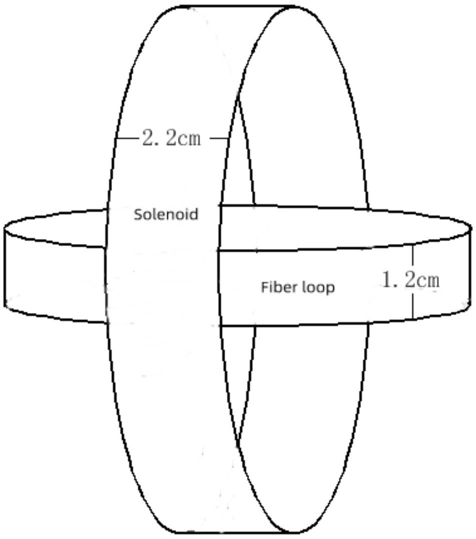

Figure 2-3

The effect of current on the experimental values was 4.67/A in Experiment A-1 and 3/A in Experiment A-2. It can be observed that the effect of current on the experimental values was both of one order of magnitude.

As shown in Figure 2-3, the fiber loop uses the optical fiber total length of 280 （m）, divided into n layers of winding, each layer is 100 turns. Assuming that the only fibres that produce Faraday Effect in experiment A-1 are the projections at the solenoids (in fact, they are also produced outside the solenoids, but weaker), the length of fibres that produce Faraday Effect in experiment A-1 is nx2x100x2.2 = 440n （cm）. In experiment A-2, one component of the parallel magnetic field is 1.2cm per layer of fibres, so the length of fibres producing the Faraday Effect is 1.2n（cm）. The Faraday Effect is only related to the strength of the magnetic field, the material of the medium and the length of the fibre in the direction of the parallel magnetic field, but not to other factors. However, The radial and axial fiber positions of each layer are almost equal in the solenoid, so for the same magnetic field environment, the experimental A-1 Faraday Effect is at least 367 times that of experimental A-2. Therefore, the effect of the Faraday Effect on experiment A-2 is negligible. However, the effect of the current change on the experimental value of A-2 is of the same order of magnitude as that of experiment A-1, Obviously, the A-2 experimental results are not caused by the Faraday Effect, but must be due to other factors.

3.Experiment conclusion

Through the above experimental results and experimental analysis, neither the Cotton-Mouton Effect nor the Faraday Effect can cause the phenomenon of experiment A-2, and the existing electromagnetic optical model cannot explain the above experiments. If there is a new photoelectric medium, it can fit the above experimental data perfectly, so we are convinced that a new photoelectric medium is discovered.

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