

The ring fibre-optical current sensor

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The quick development and expansion of power lines and electrophysical devices of a high and ultrahigh voltage (1200 kV and more) has served the reason of occurrence of new methods and instruments (sensors) of the characteristics measuring these objects. In particular, the electrooptical methods are perspective. They based on the transformation of measured electrical quantities in parameters of the optical radiation and using of optical channel for the measuring information transfer from a zone of a high voltage to a low voltage part of the measuring device. Advantages of these methods are the high speed, security from electromagnetic noises, and also reliable natural electrical isolation between high-voltage and secondary measuring zones owing to their complete electrical uncoupling.

The modern fibre-optical sensors (FOS) allow to measure almost all characteristics of physical fields, but their parameters, naturally, require improving, and schemes of application - betterment. Therefore the study and examination of FOS is a rather actual problem.

In this work the experimental model of the ring type fibre-optical sensor of an electrical current is offered. It uses two fibre-optical reels and measuring of a signal on difference frequency $\Delta\nu$. The calculations are carried out, the experimental model of offered FOS is created and the experimental measurements are carried out which agree with results of calculations. For the first time the ring fibre-optical current sensor with the semiconductor laser is implemented experimentally. The end faces of an optical fiber, which forms the basic contour, contact to radiated facets of a semiconductor laser. The frequencies difference $\Delta\nu$ of colliding waves in such resonator is determined by quantity of a magnetic field created by a current, which flows past on a conductor transiting through centre of the contour. The second fibre contour is optically connected with first and allows to derive a signal and to measure $\Delta\nu$.

The offered sensor has not deficiencies in already existing sensors of a current (ring schemes with gas lasers): relative awkwardness and major power consumption, inertance in preparation for the beginning of measurements.