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The materials of The Third International Scientific – Practical Conference is presented below. The Conference reflects the modern state of innovation in education, science, industry and social-economic sphere, from the standpoint of introducing new information technologies.

Digest of Conference materials is presented in 3 parts. It is interesting for a wide range of researchers, teachers, graduate students and professionals in the field of innovation and information technologies.

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ZEEMAN LASER GYRO IN QUASIFOURMODE REGIME

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Zeeman laser gyro optimized mathematical and software provision permitted to increase the devices accuracy by 10 times is presented.

Keywords: laser gyro, mathematical and software provision

Laser gyros are applied more and more in the navigation and control systems of the different class of accuracy, being especially demanded in the range of 0.1 – 0.005 °/h.

Laser gyros with magnetooptical biasing combines the inherent laser gyro accuracy potential and extremely high exploitation characteristics being unachievable for other types of gyros such as mechanical, fiber and hemispheric resonant gyros, etc. (ready time 1-3 s, shocks 150 g, vibration 35 g in the range of 20 Hz – 2 kHz, temperature range –55…+70 °C).

In Russia the magnetooptical laser gyros with original design covered by patents (first patent was taken in 1964) are being produced by JSC "RDI "Polyus" named by M.F. Stelmakh". This laser gyro has biasing on Zeeman effect. Nondithered laser gyros with magnetooptical biasing are named "laser gyros of the second generation".

One of the main advantage of the laser magnetooptical gyros is the possibility of realization the fourmode generation, thus providing the compensation of the correlated magnetic-nature errors and by that the improvement accuracy of these devices.

The known method of creation the conditions for fourmode generation in the ring laser by the special design of the resonator and by the specific readout device to realize the definite four frequencies combination presents some difficulties.

New approach of the fourmode concept is so called quasifourmode Zeeman laser gyro. In such gyro the resonator design and the readout device are the same as in twomode one, while the fourmode regime is provided by electronic switching (reversing) of two pairs of frequencies (modes) with orthogonal polarizations in pairs. Thus instead of complicating the design a problem is passed to electronic and software-mathematical methods of the mode switching with further processing of the gyros output signals, that is easily decided at the modern level of microcomputer [1].

The switching from one generation mode to another is made by the ring laser perimeter to be changed with help of the perimeter control system accordingly to given algorithm. This algorithm is also used for compensation of the information accuracy short-term decreasing occurred in the mode switching moment.

Experimental results proved that developed Zeeman laser gyro optimized mathematical and software provision permitted to increase the devices accuracy by 10 times without limitation of dynamic characteristics.

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THE CONTROL OF THE MICROWAVE PLASMA CHEMICAL REACTOR THERMAL MODE

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The aim of this paper is to describe the importance of temperature measurement for natural gas conversion process in microwave plasma chemical reactor and evaluate the accuracy of measurements. Microwave plasma chemical reactor is the installation for conversion of natural gas into hydrogen and carbon nanomaterial.

Keywords: Microwave plasma chemical reactor, temperature measurement, carbon nanomaterial, hydrogen, natural gas.

The problem of deep processing of hydrocarbon raw materials requires a search of new approaches and solutions. One of them is conversion of natural gas (methane) into carbon and hydrogen.

The staff of Institute of Physics and Technology of National Research Tomsk Polytechnic University have developed a technique and created the installation for conversion of natural gas (methane) into carbon nanomaterial and hydrogen[1]. This method is based on the combined effect of the catalyst and the plasma of the microwave reactor to gas. This physical-chemical effect allowed to obtain a high degree of natural gas conversion equal 76 % [2].

An important part of the nanomaterial reception process is the control of the microwave plasma chemical reactor thermal mode. When conducting temperature monitoring, we can draw a conclusion about the beginning of natural gas decomposition reaction. At the first stage the metallic catalyst (Fe, Ni, TiNi) is heated in the installation by means of ultra-high frequency