**"Gyroskopiya i Navigatsiya" №2, 2008**

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| **Randall Jaffe, Honghui Qi, Jose Antonio Rios** | **Test Results and Description of the MMQ-GTM, MEMS INS-GPS** | **3** |
| Quartz MEMS sensors have come into their own, with productions rates now exceeding 30,000 gyros per day and in excess of 25 million gyros shipped world wide. The maturity, versatility and robustness of these low cost sensors have been proven in numerous applications including unmanned aerial vehicles and imaging systems. The versatility of these low cost sensors is remarkable. Quartz rate Sensors of various designs have been used as components in secondary attitude display for commercial aviation, seeker stabilization for guided munitions, stability control and rollover prevention for automobiles and most recently as the inertial instruments for an extremely small low cost Global Positioning System (GPS) aided Inertial Navigation System (INS). This paper provides a detailed description of the MMQ-GTM, a navigation system that employs quartz rate sensors and commercially available components to create a small robust INS/GPS system. It also includes a description of the system's architecture including details on the electrical and mechanical configuration. The paper concludes with system test data demonstrating the accuracy and robustness of the MMQ-G. The data presented includes real world test conditions including loss of GPS, shock and, vibration. Data plots show some of the available system outputs. For example the system's position, attitude and velocity are plotted as a function of time. Two cases are considered. The first case demonstrates the system performance while a valid GPS signal is available. The second case demonstrates the system performance where GPS had been acquired and was later temporarily unavailable. The paper analyzes the system response prior to the loss of GPS, during the time that GPS was unavailable and finally the system's response after GPS was reacquired and updates were again available to the Kalman filter. |  |

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| **R. Stančić, S. Graovac** | **Integration of a low-accuracy strapdown inertial navigation system and GPS, the concept and results** | **16** |
| Òhe concept and results of integration of a strap-down inertial navigation system (INS) based on low-accuracy inertial sensors and the global positioning system (GPS) has been presented in this paper. The integration is made by implementation of a Kalman filter scheme both for alignment and navigation purposes. Traditional integration schemes (centralized and cascaded) are basically held on the usage of high-accuracy inertial sensors. The idea behind suggested algorithm is to use low-accuracy inertial sensors and GPS as the main source of a navigation information, while the acceptable accuracy of INS is achieved by the appropriate damping of INS errors. The specified values of damping coefficients can have different influence depending on the fact whether the moving object is maneuvering or is moving with a constant velocity during the intervals of absence of GPS data. The analysis of integrated navigation system performances is made experimentally using the data acquired along the real ground vehicle's trajectory and by artificial introduction of intervals of absence of GPS data on the parts characterized both by maneuver and by constant velocity and by varying the values of error damping coefficients. |  |

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| **V.V. Nikulin, Josef Sofka, Victor Skormin, David Hughes, David Legare** | **Demonstration of optical connectivity between two mobile platforms** | **28** |
| Successful pointing, acquisition and tracking are crucial for the implementation of laser communication links between ground and aerial vehicles. This technology has advantages over the traditional RF communication thus justifying the research efforts presented herein. A communication system providing two-way optical connectivity between two mobile ground stations is described. It utilizes mechanical systems for optical platform stabilization and initial beam positioning, optical tracking for maintaining the line-of-sight communication, and global positioning systems for mutual position awareness between the vehicles when the line-of-sight is obstructed. Particular system components and the challenges of their integration are described. The results of laboratory testing of the resultant system under the conditions emulating motion effects of ground vehicles are presented. |  |

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