**"Gyroskopiya i Navigatsiya" №2, 2006**

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| Motivated by the increasing computer power, the improving quality of digital imaging and the many unmanned aerial vehicles being developed, this paper proposes "camera images" in addition to absolute positioning and inertial measurements as source of information for the guidance and situation awareness of unmanned aerial vehicles. A fully GPS-IMU stabilized UAV helicopter is equipped with a single video camera, mounted on a pan-tilt device. The combination of IMU, GPS and magnetometer data with information subtracted from sequences of digital images significantly increases the situation awareness of the vehicle. To overcome the uncertainties inherent to vision and to create a robust system, a cognitive approach is used. Based on the idea that as long as the system knows the certainty of its observations it can react in accordance, the uncertainties are reduced using active vision. The vision-based awareness and guidance algorithms are tested in simulation while the image analysis algorithms are also tested in real life and can detect and track landing pads, provide guidance towards the objects of interest and can reconstruct 3D terrain information using a single camera. Finally the system can provide collision avoidance reflexes to avoid fatal collisions. The proposed system features a significant increase in awareness for a very modest weight and cost. | |  |

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| **N.V.Drobyshev, V.N.Koneshov, I.A.Papusha, M.Yu.Popelensky, Yu.E.Rozhkov** | **Rcurrent algorithm using gravimetric survey data for vertical deviation definition, based on stochastic approach** | **75** |
| Global models of the gravitation field are necessary for solving problems intended for large Earth areas. Global models of the gravitation field make it possible to achieve accuracies of altitude and geoid altitude abnormalities satisfying many applications. Plum deviation error is too large for geodetic applications. Error analysis shows that the only way to increase the accuracy is to use data with higher resolution, i.e. the gravimetric survey data. The proposed method for vertical deviation calculation is based on the stochastic approach. This approach proceeds from the assumption that gravity abnormalities are stochastic variables with zero expectation. At that the abnormal field of gravitation is the uniform and isotropic field with known stochastic characteristics specified by covariance functions. Undoubted merits of this method are possibility of using iterative procedure making possible processing data obtained on vast areas and possibility of operating with different types of data particularly with aero gravimetric survey data carried out at different altitudes. The traditional and proposed methods are compared at calculations of vertical deviations for the Eastern part of the Black Sea and Southern part of Ladoga Lake. | |  |

**Proceedings of 8th Conference of Young Scientists   
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