запроектовані з дотриманням вимог діючої Інструкції з врахуванням ситуації і рельєфу в районі робіт. Висоти точок знімальної мережі визначаються шляхом технічного нівелювання у вигляді 3-х нівелірних ходів.

APPLICATION AND DEVELOPMENT OF GPS IN DEFORMATION MONITORING

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With the development of modern science and technology and the advancement of deformation monitoring technology, the building deformation monitoring technology is also improving and improving day by day. The use of GPS technology for bridge deformation monitoring can avoid the limitations of traditional measurement technology in terms of elevation, distance and visibility conditions, and greatly reduce the workload of the field, improve the monitoring efficiency, and make GPS technology useful in bridge deformation research and health Monitoring has been increasingly widely used. The continuous improvement and improvement of the speed, accuracy and mode of GPS positioning and measurement, and the continuous improvement of ground measurement and control accuracy, the gradual improvement of GPS satellite constellations, the continuous progress of refined geoid survey research, the improvement of GPS receiver performance and the improvement of data processing software are inseparable.

During the construction and use of the building, due to the comprehensive influence of various subjective and objective factors such as the engineering geological conditions of the foundation, the treatment method of the foundation, the load of the upper structure of the building (structure), etc., it may cause the foundation and surrounding strata to occur. Deformation, the building will also undergo deformation due to the deformation of the foundation and the combined action of external loads and internal stresses. This kind of deformation is possible within the specified range. If it exceeds a certain limit, it will bring safety hazards to the production and operation of the building. In severe cases, it will also cause the building to crack or cause the building to fail. Even settlement leads to tilt and even the overall collapse of the building. Therefore, in order to ensure the quality of the project and the safety of the building, it is very important to study its deformation

factors, deformation speed and deformation law, analyze and predict abnormal deformations in order to take timely countermeasures in the design, construction, and operation management stages of the building meaning.

In deformation monitoring, an independent coordinate system is often used. Although the coordinate system can be flexibly established according to the needs of the project, it is generally not allowed to change the coordinate system once it is established. Otherwise, the correctness and completeness of the monitoring data cannot be guaranteed. For example, in subsidence monitoring, an independent elevation system is generally used. This system can be combined with the national or local elevation system, or it is not necessary to conduct the joint measurement. It only needs to be explained in the result data. The focus of deformation monitoring is to express the changes in the position of the observation point, and the absolute space of the observation point.

At present, global positioning technology, geographic information technology and remote sensing technology are developing in the direction of mutual integration and mutual integration. The organic combination and cross application of the three technologies form an integrated system and method with more powerful functions and wider applications. The system usually consists of data collection, data transmission and data processing and analysis. Through comprehensive collection of the three-dimensional coordinate information of the monitoring point, a large amount of monitoring data can be analyzed and processed in time, and the deformation status and deformation law can be evaluated in real time, Predict its development trend, and provide a scientific basis for the analysis and prediction of the possibility of disasters. Therefore, GPS technology has great development prospects, such as the establishment of a 3S (GPS, GIS, RS) deformation monitoring system.

Although GPS is widely used in deformation monitoring, there are still many shortcomings. For example, in mountains and valleys, underground, densely built areas and deep forests, due to the influence of satellite signals and multipath effects, its monitoring accuracy and reliability Not high or cannot be monitored. In this case, it is necessary to cooperate with other deformation monitoring technologies to meet the monitoring accuracy requirements. In addition, with the continuous development of measurement technology, there are many types of instruments and technologies used in deformation monitoring, and each has its own advantages and disadvantages. In actual deformation monitoring, a variety of technologies should be used according

to the actual situation, and various instruments should be used to make Observation data is more accurate.

ПРИМЕНЕНИЕ БЕСПИЛОТНЫХ ЛЕТАТЕЛЬНЫХ АППАРАТОВ В СЕЛЬСКОМ ХОЗЯЙСТВЕ ПРИ РЕАЛИЗАЦИИ ЗАДАЧ ТОЧНОГО ЗЕМЛЕДЕЛИЯ

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Вследствие глобализации мировой экономики сельское хозяйство как развитых, так и развивающихся стран сталкивается с рядом серьезных проблем. Одной из них является поиск путей увеличения экономической эффективности аграрного производства в условиях удорожания энергоресурсов, сырья для производства минеральных удобрений, дефицита органических удобрений и сокращения площади сельскохозяйственных угодий, которое в странах Европы в последние десять лет составляет в среднем 0,7 % в год, а в Беларуси достигает 0,1–0,4 %. Действенным способом успешного решения данной проблемы является внедрение точного земледелия – современной концепции управления сельским хозяйством, использующей цифровые технологии для мониторинга и оптимизации процессов сельскохозяйственного производства. Геоинформационные технологии и дистанционное зондирование являются неотъемлемой составляющей системы точного земледелия, позволяющей использовать цифровые методы для мониторинга и оптимизации процессов сельскохозяйственного производства.

Надежным источником получения актуальной информации о состоянии сельскохозяйственных культур являются данные ДДЗ сверхвысокого разрешения, получаемые с беспилотных летательных аппаратов (БПЛА), или как их часто называют, дронов. Рынок такого оборудования постепенно расширяется, а сельскохозяйственные или агродроны занимают в нем довольно значительный сегмент. От 7 до 8 % общего количества дронов, используемых в мире, приходится на дроны, применяемые именно в сельском хозяйстве. По прогнозам аналитиков консалтинговой фирмы Gartner, выручка от поставок дронов к 2020 году достигнет $11,2 млрд. По оценкам Массачусетского технологического института (США) рынок услуг, предоставляемых аграрному