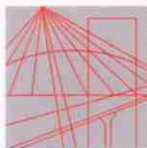


6TH INTERNATIONAL CONFERENCE ON SAFETY AND DURABILITY OF STRUCTURES

May 13-15, 2014 Wrocław, Poland

UNIVERSYTET PRZYRODNICZY



6th International Conference on Safety and Durability of Structures

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SELECTED ISSUES CONCERNING THE DETERMINATION OF DISPLACEMENT POSITION OF OBJECTS OF SLENDER STEEL- SPATIAL STRUCTURES

The increasing social needs, continuous technical development, greater technological capabilities lead to the fact that erected constructions are becoming larger, more technically complex, yet more economically implemented.

Taking all that into consideration it could be assumed that more objects around us representing a potential threat to the surrounding reality, including humans living in close proximity. This situation also occurs in the case of construction of towers and masts of spatial steel structures. Therefore, more attention should be paid, on a properly executed surveying and geodetic measurements, which result are determined the objects displacement of location. The results of geodetic measurements are an important source of information, giving rise to carry out rectification that reduce the current spatial position of objects into the correct position.

Generally speaking deformation measurements should be carried out in the most optimum atmospheric conditions i.e. at the optimum temperature of about 18 ° C, in a windless day, with possibly limited sunlight. This view is most correct in the case of almost all measurements requiring the high precision of calculating spatial coordinates. However, it seems that in case of the deformation measurements of the slender object the approach to optimize the measuring conditions should be opposite, because in studies we should also determining the position of the examined objects in extreme weather conditions. This means that measurements should be carried out during strong winds, preferably blowing from different directions, in bright sunlight with changing angle of incidence of solar radius. It is obvious that in this case, the accuracy of the time-changing positions of the object would be substantially lower. However, according to the authors it is more important to capture these extreme displacements of objects, determined by methods characterized by a short observation times, and what is obvious but acceptable, giving less accurate positional changes of the investigated objects. It is obvious that, for determining the rectification corrections independent measurements should be performed when bad weather impacts are minimal. Procedure discussed above guarantees a notice of tested objects dangerous conditions and, after the strong recovery in the field reduces the possibility of failure.

Keywords: deformation measurements, towers and masts of spatial steel structures

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MEMS TECHNOLOGY IN SAFETY ISSUES OF CONSTRUCTION ELEMENTS

Surveys provides information about geometric state of the construction elements of an object. This data allow for definition construction shape. On monitoring consist a lot of observation, frequently updated, and processed in order to determine deformation. If the monitoring is to be effective it must be adapted to the type of elements and hazard and survey should be accurate and continuous. Measurements carry out by classical geodetic methods are expensive, and in a lot of cases are punctual, cyclic (survey carry out as is in object exploitation instruction) or no simultaneous (not carry out in all important points at the same time).

Authors propose use a simple devices with MEMS components such as accelerometer, gyroscope, magnetometers, humidity and temperature sensors. This devices allows for continuous, simultaneous, high accuracy survey and the cost of such devices is low.

Experiment was carry out on sandwich wooden beam composed of two wooden strip (50 x 150 mm) and polyurethane foam (150 x 300 mm) and the length of the composite element is 2,70m

Keywords: sandwich beam, MEMS technology, strain gage, measurement

ABOUT THE CONFERENCE

VI International Conference on Safety and Durability of Structures is a cyclical conference, which preceding editions were concentrated on hydraulic structures. Now the extended scope enable scientific discussion on building, agriculture, water engineering and other structures. The conference integrates various sectors of construction professionals, engineers, designers, technologists, exploiters and a substantial number of contractors. This creates the opportunity to present actual problems and solutions from this domain of civil engineering based on scientific researches and application of modern materials and diagnostic methods.

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