

Detecting Rigid Body Movements from TLS-Based Areal Deformation Measurements

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SUMMARY

The use of Terrestrial Laserscanning for deformation measurements is well-established in engineering geodesy. Still, the available processing techniques for obtaining deformations from point clouds and for their statistical assessment are quite restrictive. This paper describes an approach to obtain rigid body movements of objects based on point clouds that were recorded in consecutive epochs. The introduced approach comprises two steps. In the first step the object's geometry is modelled in each epoch as a B-Spline surface. The main concepts of the object modelling using B-Splines are introduced in the paper. The second step refers to deriving the elements of the rigid body movements using a similarity transformation between the control points of the modelled B-Spline surfaces. One advantage of the introduced approach is that it uses well-known point-based methods of deformation analysis and allows areal-based considerations at the same time. The applicability and the performance of the method are shown for measurements obtained at an aluminum- test specimen having a B-spline surface with known parameters. The rigid body movements components obtained from point clouds are statistically compared with the ones obtained from point-based measurements of a Lasertracker.