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Development of monitoring system for large infrastructures by drone utilizing a digital image correlation method with omnidirectional camera

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Abstract

Many large infrastructures such as bridges suffers from a damage due to aging in Japan. Damage inspection is generally being evaluated by visual inspection. However, cost and safety issues arise with the installation of scaffolds. Therefore, there is a need for a simple damage inspection method for infrastructure facilities at the site. In order to overcome the problem, an advanced nondestructive inspection technique is proposed by using drone and omnidirectional camera. Based on previous research, it is possible to correct the relationship between the captured images before and after moving the camera, and when shooting with a camera from a moving vehicle,It has been shown that displacement can be measured within 5% error even from a moving vehicle by correcting the difference between the captured image in the depth direction and the left-right direction.In this study, deformation measurement system for large structure was developed utilizing a digital image correlation (DIC) method by omnidirectional camera was developed. First, measurement sensitivity of DIC by omnidirectional camera was compared to the conventional camera. Developed method could be measured wide area compared to the conventional camera with same sensitivity by an image distortion-corrected technique

Keywords: Digital Image Correlation, Omnidirectional camera, Drone, Non-contact measurement, Health monitoring, Deformation measurement