英 文 要 旨

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論文題目	A parametric approach to Evaluation of the relationship between vegetation and micro-landform in hill area using LIDAR data

The objective of this study is to develop the information to be provided for natural regeneration by investigating the relationship between Micro-Landform and vegetation in hilly area of Higashi-matsuyama City in Saitama Pref. The Micro-Landform was classified based on the conversion line of the slope angle derived from DEM (digital elevation model) generated from LIDAR (Laser Imaging Detection And Ranging). Furthermore, we summarized the classification situation of each Micro-Landform by every tree measurement. Finally, the relationship between vegetation and Micro-Landform in the study area was detected by analyzing the relationship between the summarized situation of Micro-Landform and the woody life type corresponding to the Micro-Landform classification using TWINSPAN.

(1) In chapter one, the background, orientation, objection, previous studies and characteristics of this research were described. This research is designed to obtain the direction of the subject of natural regeneration.

(2) In chapter two, the characteristics of the study area and the data used in this study were described. We summarized the topographic conditions and vegetation conditions of the study area and performed field survey for the area that not undergoing vegetation management in Iwadono Forest Park. The LIDAR data and radio control helicopter aerial photography that used as research data were also demonstrated.

(3) In chapter three, the accuracy assessment of LIDAR data was performed. In order to derive the DEM data from LIDAR data, the laser pulse data was filtered, and the laser pulse that regarded as ground surface was then extracted to interpolate. Based on the filtering algorithm proposed by Kraus, while taking the individual features of target data into consideration, we used the Quad-Tree method to utilize the final hierarchical data model that generated by dividing the satisfied grid into quarters repeatedly. The error between the measured elevation data and filtering results was calculated, which has a good agreement with accuracy assessed area.

(4) In chapter four, we investigated the possibility of applying the radio control helicopter aerial photography for analyzing vegetation and terrain as well as assessed the accuracy. We examined the relationship between the degree of the sky opening of the forest and the spatial distribution of the laser pulse LIDAR data for both the area under Weeding work and the area that not under Weeding work as a corresponding

to vegetation management activities. The degree of sky opening of the forest was calculated by using the classification result of forest crown and between the crown from aerial photographs of radio control helicopter. The result shows that, in the managed area, much more last pulse are reflected from the space between crowns, which has a low average error by comparing with field measured data. However, there was a contrary result in the area without management. Based on the distance between the laser pulse and ground surface, we create a distribution map of tree height. Then by investigating spatial distribution of the laser pulse and its permeability, the vertical distribution of the forest was obtained.

(5) In chapter five, the Micro-Landform classification was performed based on topographical survey, field observation, and geological and soil survey. Field observation is to observe the position of particular converted point and the shape of plane at a slope as well as the condition of collapsed terrain. Topographical survey is to capture the conversion point at a slope by using the reference points that used to validate the accuracy of the LIDAR data filtering by the tool of TS. Soil survey is to investigate the change of Micro-Landform at a slope due to different soil layers, because the water erosion could cause thickness of accumulated sediment often change. According to the result, the local Micro-Landform could be classified as Lower sideslope, Crestslope, Upper sideslope, Headhollow and lower sideslope.

(6) In chapter six, The Micro-Landform was classified by using conversion line of the inclination angle from DEM generated from LIDAR data. This result was compared with the Micro-Landform classified by the field measurement data, and the result indicated that two classification data were consistent with high accuracy.

(7) In chapter seven, the life type of the trees in hilly area was investigated by summarizing the situation of the Micro-Landform classification after measurement of every tree in the study area. Finally, the relationship between vegetation type and Micro-Landform in the study area was revealed by analyzing the relationship between the Micro-Landform classified in this study and woody life type corresponds to the Micro-Landform classification using TWINSPAN.

(8) In chapter eight, summary of the main results.

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