

Application of Dual-tree Complex Wavelet to Three-dimensional Point Clouds of Pavement Surfaces

Kazuya TOMIYAMA¹, Yuki KOTANI², Yuki YAMAGUCHI³ and Kazushi MORIISHI³

¹ Division of Civil and Environmental Engineering, Kitami Institute of Technology,
165 Koen-cho Kitami, 090-8507, Japan. tomiyama@mail.kitami-it.ac.jp

² Graduate School of Engineering, Kitami Institute of Technology,
165 Koen-cho, Kitami, 090-8507, Japan.

³ Obayashi Road Corporation, 8-8-2, Sarugaku-cho, Chiyoda-ku, 101-8228, Japan.

ABSTRACT

The demand on the application of three-dimensional point clouds is recently increased in pavement engineering fields. This study discusses evaluation of road surface properties by the dual-tree wavelet transform which is able to implement directional multiresolution analysis applied to three-dimensional point clouds acquired with a terrestrial laser scanner. The result shows that typical surface irregularities are distributed in specific wave bands and directions in terms of the wavy characteristics of surface properties. Finally, this study proves the capability of the directional multi resolution analysis by the dual-tree complex wavelet transform enabling the identification of definite areas of surface irregularities which require maintenance and rehabilitation in the three-dimensional point clouds of road surfaces.

Keywords: Dual-tree Complex Wavelet, Point Cloud, Road Surface, ICT.