A WAVELETS-BASED METHOD IN FILTERING
OF AIRBORNE LASER SCANNING DATA

G. Jozkow[*a]

[a] Wroclaw University of Environmental and Life Sciences, Institute of
Geodesy and Geoinformatics, Grunwaldzka 53, 50-357, Wroclaw, Poland

ABSTRACT:

An algorithm to extract ground points from ALS point cloud is presented in this work. The algorithm is based upon 2-D discrete wavelet transform. Condition of use a 2-D wavelet transform is a regular data, so the scanning data must be regularised in advance. In the presented work, an algorithm for data gridding in association with the data pyramid building was created. As a result of the wavelet analysis regularised scanning data is decomposed into two parts: approximation and details. The approximation is the low-frequency data and represents a coarse part of signal. In the process of ALS data filtering, the approximation can be considered as a certain type of terrain model. All three details of the 2-D wavelet decomposition are high-frequency data and contain noise of the original signal. Details with small values are the scanning errors and must be eliminated in the thresholding process. Only details with large values carry useful information about the terrain heights. An original signal is reconstructed in the process of inverse wavelet transform. In the case described, the reconstructed signal was DTM in GRID form – object points were removed in the thresholding process. Classification of points has been performed based on comparison of scanning points heights with those obtained from DTM. Results of the real ALS data filtering were compared with the reference data, therefore the values of filtering errors were calculated. The proposed method is useful – the algorithm is very fast and filtering errors had values on the level of few percent.

TOPIC: Lidar and laser scanning
ALTERNATIVE TOPIC: Not Specified