MULTISCALE ANALYSIS OF RIVERBED TOPOGRAPHY

KRISTINA POTOČKI [1], GORDON GILJA [2], ANA SOVIĆ KRŽIĆ [3], NEVEN KUSPILIĆ [4]

[1] *University of Zagreb, Faculty of Civil Engineering, Croatia,* kristina.potocki@grad.hr

[2] *University of Zagreb, Faculty of Civil Engineering, Croatia,* ggilja@grad.hr

[3] *University of Zagreb, Faculty of Electrical Engineering and Computing, Croatia,* ana.sovic.krzic@fer.hr

[4] *University of Zagreb, Faculty of Civil Engineering, Croatia,* neven.kuspilic@grad.hr

Abstract

Riverbed topography is characterized by different bedforms, such as ripples, dunes, standing waves and antidunes. Geometrical properties of bedforms are dependent on hydraulic flow conditions and on characteristics of riverbed material. Occurrence of the bedforms can significantly influence the drag component of resistance to flow and therefore present important input information for the hydraulic modelling. Dunes are especially of great interest since their height is of the similar magnitude as the flow depth and length can surpass it several times. For that reason, it is important to conduct field surveys of riverbed bathymetry and classify bedform using statistical analysis of measured data. Superimposition of dunes, where smaller and faster moving dunes migrate over slower moving larger dunes, is process connected with flow conditions and it is present at different spatial and temporal scales. Selection of objective method for classification of migrating superimposed dunes presents challenge for the researchers up to date. Application of spectral analysis, such the wavelet transform, to the temporal and/or spatial riverbed elevation profile enables decomposition of series on different scales and filtering of their geometrical properties. Multiscale analysis of the riverbed elevation profile enables further revealing of bedform dynamics that would otherwise remained hidden under greater morphological shapes within the riverbed. Spectral approach to the classification of bedforms on different spatial scales is examined on the Multibeam Echo Sounding data collected from the field surveys. Results are compared with approach using algorithm pattern recognition method by statistical analysis and discussed regarding applicability of spectral analysis approach.

Keywords: bedform, dunes, Multibeam Echo Sounding data, riverbed, topography, wavelet transform