

Influence of the groyne shape on open-channel flow behaviour along groyne arrangements: numerical analysis

Oscar HERRERA-GRANADOS¹ and Natalia KONDOŁ²

¹ Wrocław University of Science and Technology. Faculty of Civil Engineering
Wybrzeże Wyspiańskiego 27, 50-370 Wrocław, Poland
email: Oscar.Herrera-Granados@pwr.edu.pl

² Wrocław University of Science and Technology. Graduate Student
Wybrzeże Wyspiańskiego 27, 50-370 Wrocław, Poland

ABSTRACT

This contribution presents the application of two and three numerical modelling to compute flow behavior along groyne arrangements fields in a rectangular channel with different shapes. Turbulence parameters were estimated and compared in order to analyze the different turbulence structures within the groyne fields.

Large Eddy Simulation (LES) was used to elucidate the main features of the 3D turbulent flow field around sharp groynes arrangements. Nonetheless, this numerical technique is limited for small scale study cases and low Reynolds numbers. Therefore, 2D numerical modelling was also applied for the estimation of turbulence parameters along groyne arrangements, e.g. the eddy viscosity (Fig. 2).

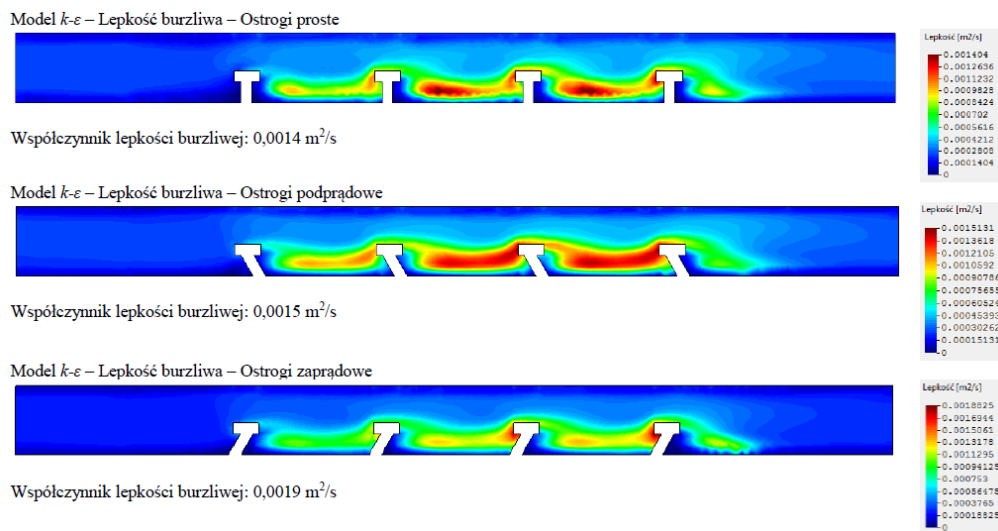


Fig. 1. Numerical estimation of the eddy viscosity using three different groyne shapes

The results of the present study provide valuable information for the correct interpretation of the flow behavior within the groyne fields; therefore for the analysis of potential solutions for the revitalization of these kind of structures in canalized streams, such as the case of the Middle and Lower Odra in Poland. In addition, it represents a start point for the analysis of sediment transport processes as well as the correct exploitation of river training solutions in small, middle and large scale case studies.