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Prediction of Boundary Shear Stress with Flood Plains Enlargements

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Abstract : The river is our main source of water which is a form of open channel flow and the flow in the open channel provides with many complex phenomena of sciences that need to be tackled such as the critical flow conditions, boundary shear stress, and depth-averaged velocity. The development of society, more or less solely depends upon the flow of rivers. The rivers are major sources of many sediments and specific ingredients which are much essential for human beings. During floods, part of a river is carried by the simple main channel and rest is carried by flood plains. For such compound asymmetric channels, the flow structure becomes complicated due to momentum exchange between the main channel and adjoining flood plains. Distribution of boundary shear in subsections provides us with the concept of momentum transfer between the interface of the main channel and the flood plains. Experimentally, to get better data with accurate results are very complex because of the complexity of the problem. Hence, CES software has been used to tackle the complex processes to determine the shear stresses at different sections of an open channel having asymmetric flood plains on both sides of the main channel, and the results are compared with the symmetric flood plains for various geometrical shapes and flow conditions. Error analysis is also performed to know the degree of accuracy of the model implemented.

Keywords : depth average velocity, non prismatic compound channel, relative flow depth, velocity distribution
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