

Elongation & Circularity Concepts, and Water Basins Ordering Systems: A Morphometric Study

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Abstract

Similar forms of hydrological drainage basins (SHDB) are calculated using several mathematical equations. The most important and famous ones are the Elongation ratio and Circulation ratio equations. These equations are not used only to categorize the water drainage basins system according to their geomorphological likeness from being rectangle or circle, but also they are very helpful means for quantification and providing geomorphological information about the basins when it comes to provide geomorphological analysis and explanations for these basins.

However, this research shows that both equations are not capable of answering all the questions about SHDB when results are cross validated by the in-situ observations. It appeared that, when performing the Elongation ratio equation on chosen hydrological drainage basins, it is useless and does not match the reality in the field as it doesn't classify the drainage basins according to its likeness of being rectangle or circle. As for Circulation ratio equation, the results were generally closer to the geomorphological reality in the field; however, it did not help in ordering the drainage basins to their circular morphological similarity. Therefore, two alternative equations were introduced to overcome these problems. The results yield better accuracy in classifying the drainage basin

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according to their morphological shape compared to the rectangular or the circular especially when cross validation is applied.

The known methods (Horton, Sterhler and Shreef) failed in classifying the stream ordering system and to estimate the actual volume for the river net according to the stream ordering class. The proposed method enabled the classification in spite of the difficulty of coding the stream ordering system classes based on it.