

UNIVERSITI TEKNOLOGI MARA

**EQUATION DEVELOPMENT FOR RESISTANCE
COEFFICIENT ESTIMATION FOR SELECTED RIVERS
IN THE HIGHLAND AREAS OF MALAYSIA**

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Thesis submitted in fulfillment of the requirements
for the degree of
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Candidate's Declaration

I declare that the work of this thesis was carried out in accordance with the regulations of University Teknologi MARA. It is original and is the result of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any other degree or qualification.

In the event that my thesis be found to violate the conditions mentioned above, I voluntarily waive the right of conferment of my degree and agree to be subjected to the disciplinary rules and regulations of Universiti Teknologi MARA.

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ABSTRACT

At present state-of-knowledge, the selection of roughness coefficients for natural rivers still remains chiefly-an-art and is merely done by referring to typical tabulated values listed in any hydraulic textbooks or handbook manuals alongside with photographs of rivers which the values are mostly unjustified for rivers in other areas of different conditions. Computations that are based solely on assumptions or predictions from secondary sources often result to error in hydraulic design. Despite various studies conducted to quantify the Manning's n values for various river conditions as happening in developed countries, Malaysia is still lack of such activities. Thus, the present study attempts to derive an equation to estimate the roughness coefficient for rivers specifically located in the highland areas of Malaysia because a proper understanding on rivers should start from its nearest source by ensuring that extensive field database from these rivers are made available for proper quantification of the bed roughness coefficient which would be very useful for future planning of the rivers. Comprehensive field measurements at 29 rivers located in the highland areas throughout Malaysia were conducted which involve data collection and laboratory analysis over an extended period of time. The newly collected database was used to evaluate the existing resistance equations to obtain Manning, Darcy-Weisbach and Chezy resistance coefficients. Suitability checking was carried out by comparing the results of the calculated velocity (V_{calc}) with the measured velocity (V_{meas}) obtained from field measurements. 30 existing resistance equations were evaluated and checked for their discrepancy ratios within range of 0.5 to 2.0, which none of the equations exceed 50% passing. Therefore, development of an equation was carried out using 77 data. The new equation; $f = 1.309(R/d_{50})^{-1.86E-03}(RS/d_{50})^{0.048}$ presented here was developed through the Multiple Linear Regression Analysis, was found suitable to estimate the Darcy-Weisbach resistance coefficient for rivers in the highland area having water-surface slope, $S_o(\%)$ ranging from 0.1 to 5.7 and bed material grain size ranging from 1mm to 3072mm. Suitability test was carried out again to validate the equation with 24 holdout samples which then the discrepancy ratio obtained a percentage of 58.33%.

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