

UNIVERSITI TEKNOLOGI MARA

**ARTIFICIAL NEURAL NETWORK SEDIMENT
TRANSPORT MODEL FOR SUNGAI BERNAM**

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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 in this thesis was carried out in accordance with the regulations of Universiti 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.

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Abstract

Artificial neural network (ANN) model is proposed as an alternative to the conventional sediment transport models for Sungai Bernam. This study evaluates the existing sediment transport equations against the local river data. Equations used in evaluations are Ackers & White, Ariffin, Engelund & Hansen, Einstein-Brown, Graf and Yang equations. Selections of the equations are based on their performance by previous investigator. Accuracy of the proposed sediment model was evaluated using the discrepancy ratio. Discrepancy ratio is the ratio of predicted to measured sediment values. From the evaluations, Engelund and Hansen equation gave the best prediction when tested against the local river data. In this study, an improvement on the equation was made and ANN is used as a tool in analysis. The proposed architecture of the sediment model is a 3 layer multi perceptron model (2:3:3:3:1) with two neurons in the input layer. The hidden layer consisting of three slabs and each slab in the hidden layer has 3 neurons. The output neuron is the total sediment load. The momentum rate parameter and learning rate parameter are 0.4, and 0.3 respectively. The proposed model was trained using 36 sets of field data and was further validated using a different set of field data. In both training and testing phases, the proposed models yield about 90% accuracy. The accuracy of the model was measured using the discrepancy ratio. Range of discrepancy ratio used for measurement of accuracy is 0.5 to 2.0.

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