Statistical Analysis and Determination of Representative Size for Sediment in Malaysian Urban Drains

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Abstract

This paper highlights the statistical analysis done on sediment samples collected from concrete drains in Malaysian major urban areas in order to understand the characteristics of the sediment and also to determine the suitable representative grain size. Samples were collected from 12 urban areas in Peninsular Malaysia and 1 urban area in East Malaysia and subjected to sieve analysis. Results from sieve analysis had shown that the major component of the sediment was sand with a mean value of 72.2%, followed by gravel with a mean of 24.7% and silt and clay with a mean of 3.1%. Samples from 10 locations have shown a non normal distribution with the tenderness to skew to the right. Due to this, the conventional use of median grain size, d_{50} as the effective size for sediment samples might not be a good representation for the sediment distribution. Further statistical analysis in this paper have suggested that the mode grain size is a much better representative grain size due to its stability when compared to median and mean size. Thus, a much better representative for the sediment samples from Malaysian urban areas would be the mode size (in this case is d_{20}).

Keywords: *Concrete drain, representative size, sediment, urban areas*

1. Introduction

Sediments commonly found in urban drains consist of particles of differing size, shape and specific gravity. Due to this, it is difficult to choose an effective grain size that is the most representative of the average particle size in the sediment sample distribution. Conventionally, the median diameter d_{50} has been assumed as the size that represents the sediment mixtures. The median diameter d_{50} has been used in the development of equations for incipient motion [1-4]. However, in using these equations at fields, the results were not satisfactory due to the different conditions compared to the controlled condition in the laboratory where the equations were developed suggesting a revision of these equations are needed [5]. This could be partly due to the sediment distribution used in the development of these equations were of uniform grain size with almost lognormal distribution; thus the median diameter, d_{50} is a suitable representation of the sediment since it coincide with the mode and geometric means of the distribution.

Available literatures by various authors have shown that grain size distribution for sediment deposits is not lognormal and tends to skew. It was found that for many fluvial gravel deposits, it tends to skew towards the finer particles (negatively skewed) [6-7]. An analysis of the data from 125 gravel-bed streams mostly from the United States with unimodal distribution have suggested in using

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Manuscript History:
Received 14 September, 2018, Revised 24 September, 2018, Accepted 26 September, 2018, Published 30 September, 2018

ISSN: 2289-7771