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JudulJurnal Ilmiah (Artikel)	:	Mathematical Model of Biological Oxygen Demand in Facultative Wastewater Stabilization Pond Based on Two-Dimensional Advection-Dispersion Model Penulis : **Sunarsih,** Dwi P. Sasongko, Sutrisno		
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		d.	Penerbit	:	Publisher: Natural State Research, Inc.
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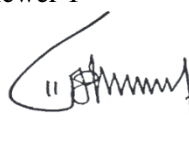| Komponen Yang Dinilai	Nilai Reviewer		Nilai Rata-rata
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Prof. Dr. Edy Soewono   Prof. Dr. Widowati, MSi
NIP. 195206261980031003   NIP. 196902141994032002
Unit kerja : Departemen Matematika FMIPA ITB   Unit kerja : Departemen Matematika, FSM UNDIP

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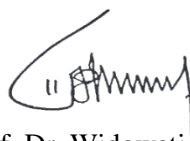
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Reviewer 1

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   Lingkup masalah meliputi dinamik BOD dalam wastewater. Dengan model advection-dispersion.

3. **Kecukupan dan kemutakhiran data/informasi dan metodologi :**

   Analisis numerik dilakukan dengan rinci dan dengan masukan datta lapangan.

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Semarang,   24/9/ 2018

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Mathematical Model of Biological Oxygen Demand in Facultative Wastewater Stabilization Pond Based on Two-Dimensional Advection-Dispersion Model

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Abstract

I n this paper, we use the two dimensional advection-dispersion model for biological oxygen demand (BOD) assessment in facultative wastewater stabilization pond. This two dimensional model refers to the width and the length of the pond. We solve the model numerically by using finite difference method. We validate the model in Sewon, Yogyakarta, Indonesia facultative wastewater stabilization pond. Based on the error of the model and the sampling data, the model gives the good result in the assessment.

Keywords

Two dimensional advection-dispersion model (/article/search?keywords=Two dimensional advection-dispersion model), biological oxygen demand (/article/search?keywords=biological oxygen demand), (/article/search?keywords=), Facultative wastewater stabilization pond (/article/search?keywords=Facultative wastewater stabilization pond), finite difference method (/article/search?keywords=finite difference method)

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Research Paper   Open Access

Evaluation of Fine Sand through Soil Stabilization with Square Pieces of Waste Plastic as Admixture for Design of Flexible Pavement in Construction of Roads

Ankit Laddha[1], Dr. D. G. M. Purohit[2]
[1]*M.E., M.B.M. Engineering College, J.N.V. University, Jodhpur, Rajasthan, India*
[2]*Professor, M.B.M. Engineering College, J.N.V. University, Jodhpur, Rajasthan, India*

ABSTRACT : *The main object of the present investigation is to study the strength characteristics of fine sand of western Rajasthan stabilized with cheap and readily available material like plastic waste. As per Indian standard classification system of soils, the fine sand has low compressive strength and high permeability and thus has nil cohesion; fine sand is not immediately acceptable for supporting flexible pavements as sub grade for construction of roads. The analysis is to achieve the possibility of fine sand stabilization with waste plastic as admixture for construction of design of pavement in roads. Present research has been taken up by addition of 5mm×5mm square pieces of waste plastic as admixture. The varying percentage 0%, 0.15%, 0.25, 0.50%, 0.75%, and 1% of square pieces of plastic waste were mixed with fine sand of different densities 1.51gm/cc, 1.54gm/cc and 1.58gm/cc (M.D.D.). All the California Bearing Ratio Tests were conducted at different mix compositions of square pieces of plastic waste and fine sand of different dry densities as arrived from Standard Proctor Test. Falling-Head Permeability Tests were also performed on different mix compositions. On the basis of the experiments performed, it is determined that the stabilization of fine sand using square pieces of plastic waste as admixture improves the strength characteristics of the fine sand so that it becomes usable as a base material for flexible pavement in construction of roads.*
Keywords – C.B.R., fine sand, permeability, square pieces of plastics

I.   INTRODUCTION

Soil stabilization is technique introduced many years ago with the main purpose to render the soils capable of meeting the requirements of the specific engineering projects. Soil stabilization can increase the shear strength of soil mass, thus upgrading the load bearing capacity of base or base coarse in the pavement of the roads. In western Rajasthan fine sand is reachable in ample, which is infrequently advisable for construction of flexible pavement of roads and necessitate either advancement available fine sand or improving good quality mineral aggregate.

Fine sand stabilization using the square pieces of waste plastic as admixture has great extent for the base coarse in the construction of flexible pavement for roads. The amount of waste plastic has increased year by year and the disposal becomes a serious problem. Particularly recycling ratio of the plastic wastes in life and industry is low and many of them have been reclaimed for the reason of unsuitable ones for incineration. It is necessary to utilize the wastes effectively with technical development in each field. This study presents simple way of recycling plastic waste in the field of civil engineering as admixture in soil stabilization. Fine sand stabilization with square pieces of waste plastic in an efficient and reliable technique for improving the strength and stability of the soils and are also cost effective technique. The technique is used in a variety of applications, ranging from embankments to sub grade stabilization beneath footings and pavements. The laboratory tests studies have been done on by direct admix of fine sand with pieces of plastic waste. Many researchers like Purohit D.G.M. et al. (2009), Awad ALKarni et al. (2012), jain O.P. et al. (1979), V. Mallikarjuna et al. (2016), Kevin M. (1978) and Wayal A.S. et al. (2012) have worked on stabilization of soils.

II.   MATERIALS USED FOR PRESENT STUDY

2.1   Fine Sand

Fine sand is found in ample in western Rajasthan. The sand used in current study was brought from location near Dangiyawas-Banar villages, at about 30-35 km away from Jodhpur on Jodhpur-Jaipur Road. Fine sand is uniform clean sand as per Unified Soil Classification System. Particles size ranges between 75μ to 1.0 mm i.e. fine coarse sand, round to angular in particle shape as per Indian Standard Classification System.

Research Paper   Open Access

Status of Air Quality and Survey of Particulate Matter Pollution in Pabna City, Bangladesh

Md. Raquibul Hasan[1], Md. Akram Hossain[2], Umera Sarjana[3],
Md. Rashedul Hasan[4]

[1](Department of Civil Engineering, Pabna University of Science & Technology, Bangladesh)
[2](Department of Mechanical Engineering, Rajshahi University of Engineering & Technology, Bangladesh)
[3] (Department of Mechanical Engineering, Bangladesh University of Engineering & Technology, Bangladesh)
[4](Department of Electrical and Electronic Engineering, International Islamic University Chittagong, Bangladesh)

ABSTRACT: *Particulate matter (PM) is the most significant air pollutant associated with death and disease compared to other measured criteria pollutants. In this paper, the study have been performed to know about the particulate pollution and its effect in human life in Pabna, a city of Bangladesh. This particulate matter ($PM_{2.5}$ and PM_{10}) concentrations in the air of Pabna city have been investigated at five selected locations in Pabna city. Investigation was done by "Handheld Laser Particle Counter" device. From this study it is found that in Pabna the air pollution problem is severe and it crosses the AQI standard. This paper also recommends the possible ways to improve the air pollution problem in Pabna, Bangladesh.*
Keywords: *Air pollution, Motor transport, Particulate matter, PM_{10}, $PM_{2.5}$.*

I.   INTRODUCTION

In parallel with the advancement of technology, industrial revolution has imported new problems. Air pollution is one of such problems and has been severely affecting the urban as well as rural area environmental quality in the globe. Particulate matter pollution is a major concern in the large cities of Bangladesh. The main contributors of air pollution are motor vehicles, brick kilns, diesel generators and industries. In recent years much research interest has been shown on atmospheric particles as they influence on climate change and cause adverse health effects [4]. The pollutant species in Bangladesh with respect to transportation systems are carbon monoxide (CO), hydrocarbons (HC), photochemical oxidants e.g., ozone (O3), nitrogen oxides (NOx), suspended particulate matter (SPM), sulfur dioxide (SO_2), and lead (Pb). Air quality monitoring data is limited in Bangladesh, however, periodic surveys by the Department of Environment (DOE), indicate that the ambient levels of SPM, SO_2 and airborne lead are higher than the Bangladesh air quality guidelines. The pollutants emitting from automobiles are obvious contributor to the pollution problem in Bangladesh; however, no emissions inventory detailing sources of pollution in national level is currently available.

Pabna, is a populated and rapidly developing cities in Bangladesh. The rapid growth of population along with unplanned land use development and inefficient traffic management system caused tremendous pressure on existing road network in Pabna city. Air pollution caused by transportation is being growing a serious environmental problem in Pabna city. It occurs due to the use of low lead gasoline without proper catalytic converters, high sulfur in diesel, large number of high polluting vehicles (nosimon/korimon), impure fuel, inefficient land use, and overall poor traffic management. The heterogeneous flows of traffic and having poor maintenance four stroke engine vehicles, which emit greater proportion of black smoke, are the major issues of concern. Moreover, gasoline pilfered from official vehicles finds its way into the informal market for sale to the auto-rickshaw and auto-tempo drivers. Such pilfered gasoline is often mixed with kerosene and when used in two stroke engines becomes a potential agent for pollutant emission.

The objective of this work is to investigate the occurrences and characteristics of the suspended particulate matters (TSP, PM_{10} and $PM_{2.5}$) at the five main points of the Pabna city, Bangladesh. This work could be used as an incentive to perform other studies in order to develop strategies that would control and diminish the air pollution problems in this region. It is also anticipated that the study would help to develop future control strategies towards creating a pollution free environment in Pabna, Bangladesh.

Research Paper   Open Access

Numerical Analysis of Switching and Current-Voltage Characteristics of Graphene Nano-Ribbon Field Effect Transistors

Farhan-Bin-Tarik[†1] and Rawdah Mahmood[2]

[1]*Department of Electrical & Computer Engineering, Clemson University, SC, USA*
[2]*Department of Electrical & Electronic Engineering, University of Dhaka, Bangladesh*

ABSTRACT: *Graphene is one of the recently discovered materials from which graphene nano-ribbon (acronym, GNR) is derived. GNR has a great impact on the nano scale field effect transistors (FET) which has been tried to demonstrate in this study. Here, we have illustrated an analytical model of GNRFET for spatial distributions of the electric potential along the channel. The analysis is performed to find out the dependences of the source-drain current on the drain voltages as well as on the back gate and top gate voltages for different geometric parameters of the device. The switching on and switching off characteristics have been demonstrated in terms of current density, channel length and gate-voltage.*
Keywords: *GNRFET, Gate Voltage, Energy Bandgap, Channel Length, Current Density, Potential Distribution*

I.   INTRODUCTION

It has not been many a year since graphene was discovered. Graphene is, basically, a carbon-based purely two dimensional material with large amount of captivating properties, especially, the prospect of ultrahigh carrier mobilities beyond those of the conventional semiconductors [1], [2], [3]. The fascinating prospects of graphene have aggravated rigorous work focused on the intensification of graphene metal-oxide-semiconductor field-effect transistors (MOSFETs) [4], [5].

Nano-ribbons (also called nano-graphene ribbons or nano-graphite ribbons), often abbreviated GNRs, are strips of graphene with ultra-thin width (<50 nm). Graphene ribbons were introduced as a theoretical model by Mitsutaka Fujita and co-authors to examine the edge and nano-scale size effect in graphene [6], [7], [8].If graphene is narrowed into slender graphene nano-ribbon (GNRs), a sizeable band gap opens [9], [10].

A large number of applications of GNRFET have maneuvered the advantages of GNR such as nano switch [11], tunneling transistor [12] etc in the recent times. GNRFET has powerful ability to control the electrostatics and hence is expected to reduce the short channel effect [13], which depends on the device electrostatics. Pei et al. [14] exploited an analytical modeling of the current at ballistic limit to evaluate GNRFET. Thiele et al. [15] applied a quasi-analytical modeling approach to analyze the current-voltage characteristics.

In this paper, we have tried to study the current density of GNRFET varying the carrier density in the device. An analytical GNRFET model [16] has been used for numerical simulation. The equations of the model include Poisson's equation in the weak non-locality approximation. Room temperature (300K) has been considered for electrical measurement. The source-drain current density versus drain voltage dependencies have been exhibited for different gate-voltages. The condition for ON-OFF with the current-voltage characteristics have been demonstrated.

II.   THEORETICAL ANALYSIS

2.1 Device Structure

As the name suggests, GNRFET is field effect transistor (FET) with graphene nano-ribbon (GNR) as the channel material. In this experiment, we have used GNRFET common source circuit for simulation and hence examined the DC characteristics. Different gate geometries have been applied to investigate the effect of gate geometry on GNRFET performance. The analytical model has been used to calculate the potential distributions in the GNR-FET as a function of the back gate, top gate, and drain voltages, V_b, V_g, and V_d respectively. We consider GNRFET with n-type channel. Therefore, positive back gate voltage, i.e., $V_b>0$ and

Research Paper   Open Access

Hydrologic Modeling for Tropical Watershed Monitoring and Evaluation

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ABSTRACT: *Excessive farming without good conservation practices is causing watersheds degradation in Indonesia. Watershed assessment and control are needed to prevent more degradation. This study aims to evaluate performance of hydrologic model for watershed monitoring and evaluation. A rainfall-runoff hydrologic model of Mock was used as main tool for modeling and applied in the tropical watershed of Wadaslintang, Indonesia. The model consists of three tanks representing hydrologic cycle processes in the atmosphere, soil and ground water system. Some hydrological parameters such us specific maximum discharge, specific minimum discharge, river regime coefficient and runoff coefficient were used for watershed evaluation and analyzed using the model from 2002-2015. Model calibration and verification were performed by using one year water discharge data 1999/2000 and 2000/2001, respectively. The result showed that the model had a good accuracy for discharge measurement where the coefficient correlation (R) value of calibration and verification was more than 0.75, volume error (VE) was less than 0.05 and efficiency coefficient (E) was more than 0.80, means that there were strong relations between observed and calculated data. Hydrologic model of Mock provides a good alternative tool for rapid watershed assessment using hydrological parameters as part of monitoring and evaluation particularly in the regions with limited hydrological data.*

Keywords: *Tank model, rainfall-runoff, model calibration and verification, hydrological parameters, hydrology cycle*

I.   INTRODUCTION

Floods during wet season are occurred in some area of Indonesia in consequence of watershed degradation as reported by Sumaryono et al. [1]; Sari and Susilo[2]; Fulazzaky[3]; Iskandar and Sugandi[4]; Hapsari and Zenurianto[5]. Land use changing due to uncontrolled farming was decreasing watershed function as a rainwater harvesting area. One of the watersheds with excessive farming activities in the upstream is Wadaslintang (192.53 km^2), located in Central Java province Indonesia (**Figure 1**).

Climatically, Wadaslintang watershed is located in the tropical region where there are two season in one year, wet season from October to March and dry season from April to September and the annual rainfall was more than 3000 mm. Wadaslintang watershed has an important role as catchment area of a reservoir in the downstream which is providing water for many uses such as fishery, water consumption, power plant, and irrigation. As one of water conservation facilities in central java with a capacity 443 million m^3, the reservoir also has a function for flood controlling.