DISPERSION OF CONSERVATIVE POLLUTANTS IN DIYALA RIVER APPLYING ONE DIMENSIONAL MODEL

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ABSTRACT

A study concerns the dispersion of pollutants in Diyala River using one-dimensional Finite difference technique (implicit method) to solve the simplified dispersion equation. The model starts at Diyala barrage and extended to the confluence of the Tigris - Diyala rivers, and for 203-Km length. The simplified dispersion model results were verified by comparison with the analytical solution for different time increments. The calibration of the model was conducted on 31/11/1998 using measured data (discharge, velocity, cross sectional area, total dissolved solids (TDS), chloride (CL), and sulfate ($SO_4^{=}$)) concentrations at the same day and the results indicated a good agreement between the computed and measured data. The verification of the model is accomplished on (13/12/98,27/12/98,10/1/99,25/1/99) and the results indicates also the accuracy of the applied model to simulate the conservative salts (TDS, CL, $So_4^{=}$) in the river.

الخلاصة

تم أجراء دراسة لتشتت الملوثات المحافظة في نهر ديالى وذلك ببناء نموذج رياضي عددي أحادي البعد للتعبير عن معادلة التشتت لهذه الملوثات وتم التأكد من النموذج من خلال تطبيق معادلة التشتت المبسطة مع الحل التحليلي لنموذج أحادي البعد ولمصدر تلوث مستمر واثبت النموذج دقة نتائجه.

تـم استخدام النموذج المحدث والذي يتضمن دراسة مقطع النهر من جسر ديالى والى تقاطعه مع نهر دجلة وبمسافة ٢٠٣ كم بوجود مصادر التلوث المرافقة له والمتضمنة (مبزل الخالص الشمالي ، مبزل النهروان - مـبزل السـارية ، مبزل الخالص الجنوبي ، ومعمل الرستمية الجديد والقديم)، وتم معاملة تلك المبازل على أساس إنها مصادر تلوث نقطية (point source).

تم إجراء فحص المعايرة من خلال مقارنة التراكيز الملحية المقاسة في النهر مع تلك المحسوبة في النموذج بتاريخ ٣١/ ١١ / ١٩٩٨ولمحطتين على النهر، وباستخدام المعلومات المقاسة المتمثلة في التصريف، سرعة مقطع القناة، ألاملاح الكلية الذائبة، الكلوريدات والكبريتات وكانت النتائج متقاربة بين المعلومات المقاسة والمحسوبة في٣١/ ١١ / ١٩٩٨ فيما تم إجراء التحقق للتواريخ (١٣ / ١٢ / ٩٨ ، ٢٧ / ١٢ / ٩٨ ، ١٠ / ١ / ٩٩ ، ٢٥ / ١ / ٩٩) وأثبتت الفحوصات دقة النتائج المستحصلة.

PLANNING THE OPTIMUM PATH FOR A MOBILE ROBOT USING GENETIC ALGORITHM

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ABSTRACT

One aspect of interest in robotics is planning the optimum path for a mobile robot or the optimum trajectory for link movements of a stationary robot in order to increase their efficiency. The objective of this paper is to identify the sequence of steps and processes needed for construction off-line path planning system using genetic algorithm (as we coined GPPS). In off-line path planning, the robot is given a map with the location of all obstacles in a given world. The goal is to construct the shortest possible path between a pre-defined start and goal positions and then follow this path without running into the obstacles. In addition to the three basic genetic operators, a new operator is proposed here which is coined as repair operator. Repair operator eliminates infeasible path segments and removes path points from nearby obstacles. However, the shortest possible path resulted from applying genetic operators and repair operator may contain overlapping and redundant segments. Hence, to eliminate these drawbacks, a new operator is proposed which is coined as enhancement operator. Eighty experiments are tested on GPPS with different cases. These cases are taken from different perspectives: number and distribution of obstacles, size of obstacles, and number of experiments per a workspace. All experiments with these different cases give, as possible, an acceptable feasible path.

الخلاصة

إحدى المظاهر في ما يتعلق بأهمية الروبوت هي تخطيط أفضل طريق للروبوت المتحرك أو أفضل مسار من الحركات المرتبطة ببعضها للروبوت الثابت وذلك لزيادة كفاءته. الهدف من هذا البحث هو تعريف مجموعة الخطوات و العمليات اللازمة لبناء نظام تخطيط طريق لخريطة معرفة مسبقا باستخدام الخوارزمية الجينية (والذي اسميناه GPPS). في النظام الجيني المستخدم لتخطيط طريق تعطى للروبوت خريطة تحوي مواقع كل الحواجز الموجودة في المساحة التي سيتحرك فيها الروبوت. هدفنا هو تكوين أقصر مسار ممكن – من نقطة البداية إلى نقطة النهاية المعطاة– باستخدام الخوارزمية الجينية و أتباع هذا الطريق بدون الاصطدام بالحواجز. إضافة للعمليات الثلاث الأساسية في الخوارزمية الجينية، استخدمت عملية جديدة اسميناها (عملية الإصلاح). عملية الإصلاح تقوم بحذف أجزاء الطريق غير الملائمة و نقاط الطريق القريبة من الحواجز. ومن هنا فإن اقصر طريق ممكن – الناتج من إجراء العمليات الجينية و عملية الإصلاح– ممكن أن يحوي على أجزاء طريق متداخلة و متكررة. ولإزالة هذه العيوب اقترحنا عملية جديدة تدعى (عملية التحسين). ثمانون تجربة أجريت لاختبار (تخطيط الطريق باستخدام الخوارزمية الجينية) لحالات

WATER TREATMENT OF COOLING TOWERS BLOWDOWN BY REVERSE OSMOSIS

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ABSTRACT

An experimental investigation was conducted to study the effect of operating parameters on the permeable conductivity and product rate were studied for reverse osmosis process. The parameters studied were : - conductivity of feed water in the range of (1000-1500 μs/cm), pH in the range of (4-10) and operating pressure in the range of (3-6 bar).

The best operating conditions, which lead to good quantity and quality for water product, are: (1000 μs/cm) conductivity of feed water, (7) pH, and (6 bar) operating pressure. At these conditions the permeable conductivity is (52.905 μs/cm), and the product rate is (328.143 l/hr).

الخلاصة

تمت دراسة عوامل التشغيل التي تؤثر على النفاذية ونوعية الماء الناتج في عملية التنافذ العكسي وهذه العوامل كانت : موصلية الماء الداخل والاس الهيدروجيني والضغط التشغيلي

النتائج دلت على ان الظروف التشغيلية التي تحقق كمية ونوعية عالية من الماء الناتج من عملية التنافذ العكسي هي: موصلية الماء الداخل (1000 μs/cm)، pH (7) والضغط التشغيلي(6 bar). عند هذه الظروف تكون موصلية الماء الناتج (52.905 μs/cm) وانتاجية الغشاء (328.143 l/h).

KEY WORDS

Reverse osmosis, Water treatment, Cooling tower blowdown.

INTRODUCTION

The transport of any species through the membrane is driven by a difference in chemical potential of that species across the membrane (Paul D. R., 1976). The driving forces are either from differences in pressure, concentration, electrical potential, or combination of these factors between the fluid phases across the membrane (C. N. Jayarajah, 1999).

Membranes that allow selected materials to pass, such as water or dissolved gases but prevent the passage of other materials such as dissolved minerals are referred to semi-permeable (SourirajanS., 1970, James M., 1985).

When a semi-permeable membrane separates fresh water and a salt solution, water will diffuse from the fresh waterside into the salt solution. This phenomenon is called osmosis. The semi-permeable membrane prevents the salt from migrating into the fresh waterside (Chabris A. H., 1989, M. E. Terril). The osmotic flow continues until a state of equilibrium is reached. Once equilibrium is attained the difference in fluid level becomes equal to what is known as osmotic pressure of the solution (Peter, 1997).When a pressure greater than the osmotic pressure is applied to concentrated solution, water flows from the concentrated to the dilute solution side. The flow of water through a

FREE VIBRATION ANALYSIS OF TAPERED BOX GIRDER USING GRILLAGE ANALOGY AND FINITE ELEMENT METHODS.

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ABSTRACT

A general method using the theory of thin-walled structures is given for determining the natural frequencies and mode shape for box –girder of varying depth having closed section, subjected to torsion and bending using a grillage method and finite element method (plate /shell, MSC, NASTRAN) . Consistent mass matrices related to torsion and bi- moment effects have been derived using shape functions corresponding to an assumed polynomial deflection configuration, also stiffness and consistent mass matrices for flexural behavior including the effect of shear deformation and rotary inertia in bending. The stiffness matrix for beam element under non-uniform torsion is presented by using the differential equation of equilibrium.

A special computer program is written to perform the free vibration analysis starting from the element stiffness and consistent mass matrices. The results have been compared with those obtained from MSC /NASTRAN Package. Numerical examples are presented to show the effect of cell number and effect of variation for (span / width) ratio.

الخلاصة

تم استخدام طريقة عامة معتمدة على نظرية المنشآت اللوحية الرقيقة الجدران لإيجاد التردد الطبيعي و شكل الطور الخاص بالمنشآت اللوحية الخلوية المتغيرة العمق والمعرضة لتأثيري الالتواء حول المحور الطولي والانحناء.تم استخدام طريقتين للتحليل ألأولى: باستخدام طريقة المشبكات المبسطة والطريقة الثانية باستخدام العناصر المحددة (الألواح القشرية الرقيقة) من خلال برنامج جاهز (MSC/NASTRAN).

تم إيجاد مصفوفات الكتل المتوافقة المتعلقة بتأثير الالتواء حول المحور الطولي والعزم الإضافي نتيجة تقييد تأثير ألالتواء للمقطع , كذلك مصفوفات الكتل المتوافقة تحت تأثير الانحناء مع إدخال تأثير التشوه القصي والقصور الذاتي للدوران , و إيجاد مصفوفات الصلادة لكل عنصر مكافئ تحت تأثير الالتواء غير المنتظم والانحناء.

أعد برنامج حسابي لإنجاز تحليل الاهتزاز الحر ابتدأ من تجميع مصفوفات الصلادة والكتلة لكل عنصر مكافئ من المنشأ وتم مقارنة النتائج مع تلك المستحصلة من البرنامج الجاهز. تم إعداد أمثلة لغرض دراسة تأثير عدد الخلايا للمقطع العرضي ودراسة تأثير نسبة (الطول/العرض) على التردد الطبيعي.

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A GENETIC APROACH FOR AUTOMATED IMAGE GENERATION: GRAYSCALE IMAGE GENERATION

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ABSTRACT

Non photorealistic rendering is a new research field in the areas of computer graphics. The goal is to give a more natural feel to computer generated images, by simulating various artistic techniques and to give the sense of an image without reproducing it. In this paper, we present a new evolutionary approach to non-photorealistic rendering of 2D black/white and grayscale images. The goal is to generate a painting that is close to a given input image. This problem can be formalized as a high-dimensional optimization problem, with local minima. We have developed a genetic algorithm that modifies the traditional uniform crossover to spread out vital genes at the expense of lethal genes rather than exchanging them between matting parents. A vital or lethal gene can be determined via a threshold field associated with each pixel gene that indicates the distance between a chromosome gene and the corresponding input image pixel. The proposed evolutionary painting framework demonstrates good results and achieves reasonable convergence.

الخلاصة

تعتبر طريقة اداء التصوير غير الحقيقي من حقول البحث الجديدة في مجال رسوم الحاسوب. الهدف هو اعطاء امكانية اكبر لتوليد الصور عن طريق الحاسوب،بواسطة محاكاة تقنيات فنية مختلفة و اعطاء مشهد الصورة بدون اعادة توليدها. في هذا البحث تم تمثيل طريقة تقدمية جديدة للتصوير غير الحقيقي للصور الأبيض و الأسود والرمادية الممثلة بشكلىمصفوفة ثنائية الأبعاد. الهدف هو توليد رسم قريب من الصور المعطاة. هذه المشكلة ممكن صياغتها من المشاكل الأمثلية المتعددة الأبعاد التي تحتوي على نهايات سفلى. تم بناء خوارزمية جينية التي تعدل التزاوج المنتظم التقليدي لنشر الجينات الحيوية على حساب الجينات الميتة بدلا"عن تبديل هذه الجينات بين الأباء المتزاوجة. يمكن تحديد الجين كونه حيوي او ميت بواسطة قيمة فاصلة مرتبطة مع كل جين مفرد و التي تعطي المسافة بين الجين للكروموسوم مع ما يقابله من قيمة مفردة في الصورة. الرسام التقدمي المفترض اثبت نتائج جيدة و التي تحقق تقارب معقول مع الصور المعطاة.

KEY WORDS

Genetic algorithms, Painter, SUX operator, and Gray scale images.

AN INVESTIGATION OF LIQUID METAL AND GAS FLOW CHARACTERISTICS IN CONFINED ATOMIZATION NOZZLE

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ABSTRACT

Supersonic gas jets in confined liquid metal atomizing nozzle were studied by using the method of characteristics. Nitrogen at operation (stagnation) pressure of (1.65Mpa) was used in the study, with three different values of ambient pressure (1.25, 1.52 and 1.75 bar). For all the three values, the nozzle is over expanded. The Mach number at the nozzle exit for all the investigated cases was (2.64). The pressure and Mach number of the atomizing gas at various lattice points downstream of the nozzle exit were found. Besides, the effect of heat transfer from the liquid metal (aluminum) on the gas flow behavior was also investigated. The results showed that the stagnation temperature rise of nitrogen caused by heat transferred from aluminum is very small and can be neglected, and hence the flow can be assumed to be adiabatic. The results indicates that the pressure of the atomizing gas tries to adjust to the higher ambient pressure by the formation of a weak oblique "lip" shock followed by a reflected weak oblique "edge" shock. As the ambient pressure increases, the inward curvature of the jet boundary increases and hence the length of the jet decreases. As the ambient pressure increases, the point at which the oblique "lip" shock strikes the wall moves upstream toward the nozzle exit. If the shock is to be avoided, the difference between the ambient and nozzle exit pressures must be decreased. For fixed nozzle geometry, this can be done either by increasing the operation pressure or by decreasing the ambient pressure.

الخلاصة

في هذا البحث، تمت دراسة نفاث الغاز فوق الصوتي الخارج من منفث التذرية للسوائل المعدنية باستخدام طريقة المميزات. الغاز المستعمل كان النيتروجين عند ضغط تشغيلي (ساكن) مقداره (1.56Mpa)، مع ثلاث قيم للضغط الجوي خارج المنفث (1.25,1.52,1.75 bar). لكل هذه القيم الثلاثة كان المنفث مفرط الاتساع ورقم ماخ عند مقطع الخروج للمنفث كان (2.64). تم احتساب الضغط ورقم ماخ عند مختلف نقاط الشبكة بعد المنفث، بالإضافة إلى ذلك، تمت دراسة تأثير انتقال الحرارة من السائل المعدني (الالومينا) إلى الغاز (النتروجين). بينت النتائج ان الارتفاع في درجة حرارة الركود للغاز (النتروجين) بسبب الحرارة المنتقاة إليه من السائل المعدني (الالومينا) كان صغيراً ويمكن إهماله وافتراض ان جريان الغاز أديباتي. أظهرت النتائج ان ضغط الغاز المتذري يحاول ان يصل إلى قيمة الضغط الجوي العالي خارج المنفث عن طريق تكوين صدمة "شفة" مائلة عند مخرج المنفث تتبعها صدمة "حافة" مائلة منعكسة من جدار الأنبوب. زيادة الضغط الجوي خارج المنفث تسبب زيادة تقوس حدود النفاث الخارجية باتجاه الداخل، ونتيجة لذلك يقل

NON LINEAR EARTHQUAKE ANALYSIS OF BAGHDAD TOWER FOR COMMUNCATIONS USING A THREE DIMENSIONAL FINITE ELEMENT METHOD

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ABSTRACT
This study analyzes Baghdad Tower for communications when subjected to earthquake excitation using an elasto-viscoplastic material modeling and a three-dimensional finite element method. The algorithm used in this research deals with nonlinear structural analysis. Newmark's method is employed to study the displacement response under El-Centro earthquake type of excitation

الخلاصة
يقوم البحث بتحليل برج بغداد للاتصالات إنشائيا في حال تعرضه لأحمال هزة أرضية، وذلك باستعمال طريقة العناصر المحددة لتمثيل البرج هندسيا بواسطة عناصر ثلاثية الأبعاد . كما تم تحوير البرنامج الخاص بالتحليل الديناميكي لهذا النوع من العناصر مع استعمال التحليل اللاخطي في هذا البرنامج لتحديد الازاحات تحت تاثير هزة ارضية من نوع السنترو.

KEY WORDS
finite element, earthquake, elasto-viscoplasticity, dynamics, Newmark integration.

INTRODUCTION
A tall building is usually one that possesses a ratio of total floor space to total site area built upon as being very high (ASCE, 1978). Generally, towers are vertical cantilevered beams. They must cope with the vertical forces of gravity and the horizontal forces below the ground. The lateral forces are the applied loads of most importance that affect tower structures. Due to the increase of height and change of properties of towers, the dynamic analysis of towers becomes more important (Gasib, M. 1998) According to the Iraqi seismic code (1997), it is specified that "A dynamic analysis is highly recommended for specific structures such as slender high-rise buildings and structures with irregularities of geometry or mass distribution or rigidity distribution"

EARTHQUAKES IN IRAQ
Iraq lies on the north – east border of the Arabian Plate which is a semi–continuous line of earthquake foci which forms part of the well known historical Himalayan Belt earthquake. Depending on the previous studies of the history of earthquakes in Iraq, there were more than 79 major earthquakes that took place during the period between 1260 BC and 1900 AC. In fact, the

DESIGN AND ANALYSIS OF ENHANCED PERFORMANCE SIMULATOR FOR GSM NETWORK

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ABSTRACT

The rapid advances in mobile communication systems, especially in Global System for Mobile communications (GSM), have led to a wide range of developments in design, simulation, controlling mechanism, management protocols, and performance analyzing techniques of such systems.

Several software simulator systems are designed and implemented in this work. The designed systems have simulated the real GSM cellular network with all related topics concerning the control on calling mechanism, mobility managements, and others. In this concern, simulators for the GSM Cellular Network, Mobile Station, Base Transceiver Station, Base Station Controller, and Mobile Switching Center are all designed and implemented in this work.

Moreover, several Graphical User Interfaces (GUIs) are built to analyze and evaluate the performance of the designed cellular network systems at different operating conditions. This has been base on a comprehensive investigation to the mathematical analyzing approaches such as calculating the call blocking probability, the handoff dropping probability and network performance optimization after adopting the guard channel principle.

الخلاصة

إن التقدم المتسارع في تقنيات الاتصالات المتنقلة وخاصة في أنظمة GSM العالمية، أدى إلى تطورات واسعة في عمليات التصميم والمحاكاة والسيطرة وبروتوكالات إدارة الشبكة وتقنيات تحليل الأداء لمثل هذه الأنظمة.

في هذا العمل تم تصميم وتنفيذ مجموعة أنظمة محاكاة برمجية لمحاكاة شبكة الاتصالات الخلوية الحقيقية، وكل الموضوعات ذات العلاقة والخاصة بميكانيكية الاتصال وادارة التنقل وغيرها. وبهذا الخصوص فأن المحاكيات المنفذة كانت محاكي الشبكة الخلوية ومحاكي محطة التحكم ومحاكي الهاتف النقال ومحاكي بدالة النقال المركزية.

إضافة لذلك، عدد من واجهات الاتصال مع المستخدم تم بناءها لتحليل وتقييم أداء الأنظمة المصممة عند مختلف ظروف الاشتغال. وقد تم ذلك بالاعتماد على تحري شامل لتقنيات التحليل الرياضي مثل احتساب احتمالية عدم تحقيق الاتصال واحتمالية انقطاع المكالمة خلال عمليات المناولة وكذلك عملية تحسين كفاءة النظام بعد تبني مبدأ القنوات الحارسة.

THE PRODUCTION OF A PHOTOREALISTIC DIGITAL TERRAIN MODEL (P.D.T.M.)

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ABSTRACT
This research introduce an efficient and easy method to superimpose or merge an available digitized aerial photo on the common wireframe digital terrain model D.T.M. for a specific region, and to finally produce what is called photorealistic digital terrain model P.D.T.M. with the aid of Matlab programming language.

الخلاصة

يقدم هذا البحث طريقة فعالة وسهلة لدمج صورة جوية رقمية متوفرة مع النموذج التضاريسي الرقمي الترسيمي الشائع ولمنطقة معينة لكي ينتج في النهاية مايسمى بالنموذج التضاريسي الرقمي الصوري وبالاستعانة بلغة Matlab البرمجية.

KEY WORDS
D.T.M. – P.D.T.M. – Matlab – L.L.S. – G.C.P - Stereomodel

INTRODUCTION

With the rapid and amazing development of computers and programming languages facilities, many fields in surveying and photogrammetry are now become applicable like the production of photorealistic or photo texture digital terrain model P.D.T.M.
This research introduce a simple and efficient procedure for producing P.D.T.M depending on the superior facilities available in Matlab technical programming language ,and so it provides with a high quality PDTM performance and at the same time a low cost one when compared with others produced by any universal software like ERMapper and other costly software.

General Procedures

The general outlines of the project performance is by building a mesh or wireframe DTM by one of the many known methods of DTM interpolation techniques and then by superimposing or merging the digital aerial or satellite photo over that DTM properly to produce the PDTM.

Constructing a D.T.M

Much software is available now days to build a wireframe digital terrain models or surfaces which depend on some suitable interpolation techniques like:

- Kriging method.
- Inverse distance method.
- Polynomial method.

EFFECT OF FIBER ORIENTATION ON THE ROOT STRESSES OF THE GEAR TOOTH

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ABSTACT
The effect of fiber orientation angle of composite materials on the gear tooth root stresses is analytically investigated in order to select the required orientation of the fibers inside the gear tooth, which leads to improve the gear tooth strength. The effect of geometrical parameters (loaded or unloaded pressure angles, number of teeth, radius of fillet and profile correction) and type of fibers (glass, graphite and boron) are also studied. A stress analysis using the finite element method is performed for reinforced gear subject to bending loads. The results indicate that there is an effect of the fiber orientation on the root stresses of the gear tooth, and also, there is a direct proportionality between the improving of the gear strength with geometrical parameters.

الخلاصة
في هذا البحث تم دراسة تأثير توجه الألياف للمواد المركبة على اجهادات الجذر لأسنان التروس لغرض اختيار الزاوية المطلوبة للألياف داخل أسنان التروس والتي تؤدي إلى تحسين مقاومة الأسنان للأحمال. وتم أيضا دراسة تأثير الأبعاد الهندسية التصميمية Geometrical Parameters (زاوية الضغط المحملة والغير محملة ، عدد أسنان الترس ، نصف قطر المتكأ الزاوي ومعامل التصحيح) وكذلك تأثير نوع الألياف المستخدمة (زجاج ، جرافيت ، بورون). وقد تم إجراء التحليل العددي باستخدام طريقة العناصر المحددة للحصول على توزيع الاجهادات داخل أسنان التروس. وقد اتضح من النتائج المستحصلة بان اتجاه الألياف يؤثر على اجهادات الجذر لاسنان التروس، وكذلك اتضح من النتائج بأن هناك علاقة مباشرة بين اجهادات الجذر مع الأبعاد الهندسية التصميمية.

KEY WORDS
Gear, finite element, composite materials, fiber reinforcement

INTODUCTION
One of the primary causes of gear tooth failures is the presence of large tensile stresses in the root fillets of loaded gear teeth. These stresses tend to reduce overall gear life and can result in catastrophic tooth failure under peak loading conditions. Therefore, many methods are investigated to improve the strength of gear teeth, one of these methods is to reinforce the gear teeth with fibers as shown in **Fig. (1).**
Many attempts have been made by earlier investigations to relate tensile fillet stresses observed in statically loaded gear teeth to the geometric appearance of the tooth.

CAD/NC INTEGRATION WITH THE OOP SUPORT

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ABSTRACT

Now days; large and small manufacturing companies own several numerically controlled (NC) lathe machines. They are finding that NC/CNC machines can make dramatic saving possible. Certain aspects of NC/CNC shop operations require a high skilled operator level than conventional method. So that the need to develop a computerized technology to support the adoption of these machines and get the maximum benefits that's offer is highly recommended. The present work aims to develop such system that stand over the most modern available technologies to support this task. The system database is used to organize the factory data. The database hold factory lathe machines definition at current state tooling and the available tools and materials with the recommended machining parameters for each machine-tool-material combinations.

The developed system is interactive supported with a powerful graphics package (AutoCAD) which gives the system user the ability to describe the part manufacturing process through direct manipulation of the part and stock in process drawing with the aid of friendly user machining process dialog box. The system offers as output different types of the product documentation files these are the process plan sheet, the computer aided plan description model, and a DXF (Drawing Exchange File) format which may be used to exchange the product information between the CAD/CAM systems. Finally the system postprocessor is used to generate NC/CNC Code (G-Code) files that are necessary to operate the predefined machines to produce the part.

الخلاصة

ان اغلب شركات التصنيع الصغيرة والكبيرة تمتلك العديد من مكائن الخراطة ذات السيطرة الرقمية . هذه الشركات وجدت ان استخدام هذا النوع من المكائن يمكن ان يؤدي الى اختزال كبير في الكلفة والجهد . ان بعض عمليات التشغيل في هذه المكائن تتطلب مشغل ذو خبرة عالية مقارنة بمشغل مكائن الخراطة الاعتيادية . وعليه اصبح من المهم جداً تطوير تقنيات حاسوبية لاسناد عملية تشغيل مثل هذه المكائن للحصول على أقصى فائدة ممكنة منها . هذا العمل يهدف الى تطوير نظام يعكس النظرة المتكاملة لعمليتي التصميم والتصنيع بالوقوف على أحدث التقنيات المتوفرة لاسناد هذه المهمة .

تستخدم قاعدة البيانات في هذا النظام لغرض تنظيم بيانات المعمل. ان قاعدة البيانات هذه تحتوي على تعاريف مكائن الخراطة بعددها الحالية وبقية العدد والخامات الهندسية المتوفرة مع قيم التشغيل المناسبة لكل مجموعة اقتران (ماكنة – عدة – معدن) . النظام المطور تفاعلي مسند بحقيبة رسم (AutoCAD) والتي تعطي مستخدم النظام القدرة على وصف عملية تصنيع المنتج من خلال المعالجة المباشرة لرسم المنتج مع

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ASSESSMENT OF EQUIVALENT GRAIN DIAMETER FOR SOIL SPECIFIC SURFACE DETERMINATION

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ABSTRACT
A procedure is presented to calculate an equivalent diameter for soil grains to be used to calculate the specific surface of the soil. The typical grain size distribution curve is expressed as a normal probability distribution cumulative curve and the frequency corresponding to the equivalent diameter is accordingly found. This frequency is adopted as the percent finer corresponding to the equivalent diameter. A relation is given for the calculation of the specific surface using the equivalent diameter. Grain size distribution curves of many soil samples are collected. A value for the specific surface of each soil is determined summing the surface area of subintervals in the distribution curve. The values of specific surface obtained from these gradation curves are compared to those calculated using the proposed values of the equivalent diameter for each soil.
The results have shown good agreement for using the equivalent diameter that presented in this paper to determine the specific surface for soils instead of using the usual long procedure.

الخلاصة
تـــم تقديم منهج عملي لحساب القطر المكافئ لذرات التربة لكي يتم استخدامها في حساب المساحة السطحية النوعـــية للتربة. وتم التعبير عن منحني التوزيع الحبيبي للتربة كمنحني احتمالات طبيعي متجمع و كذلك تم ايجاد التكرار المقابل للقطر المكافئ تبعا لذلك . وتم اعتماد هذا التكرار كمصحح مئوي مقابل للقطر المكافئ. وقد اعطيت علاقة لحساب المساحة السطحية النوعية باستخدام القطر المكافئ .

تـــم جمـــع بيانات لمنحني التوزيع الحبيبي للعديد من النماذج وتم تعيين قيمة المساحة السطحية النوعية لكل عينة بحساب المساحة السطحية للمسافات الثانوية في منحني التوزيع .اجريت مقارنة لقيم المساحة السطحية النوعيةالتـــي تـــم الحصول عليها من منحنيات التوزيع الحبيبي هذه بتلك المحسوبة باستخدام القيم المقترحة للقطـــر المكافـــئ لكـــل عينة. وقد ظهرت نتائج جيدة لاستخدام القطر المكافئ المقدم في هذا البحث لحساب المساحة السطحية النوعية عوضا عن استخدام المنهج العملي الطويل المعتاد.

KEY WORDS
Effective diameter, equivalent diameter, specific surface, grain size distribution

A PROPOSED DESIGN FOR R.C BLAST RESISTANT BARRIERS

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ABSTRACT

In this study a proposed design for reinforced concrete barriers in industrial units is presented. The barriers are deemed to mitigate the hazards of internal explosions to protect the surroundings.

The Technical Manual (TM5-1300) for fortified structures recommends the use of lacing reinforcement barrier walls when the plastic rotation exceeds a specified limit. Such reinforcement is essential in shear design but it needs special skill and additional cost. To avoid using lacing reinforcement, walls of grillage system is proposed in this study to reduce the plastic rotation of panels. The panels are designed to respond plastically, while the grillage members respond elastically. This is advantageous from recruiting point of view since only the blast-damaged panels may be repaired.

Results have shown that the (SDOF) analysis method as recommended by the (TM5-1300) [D.C., 1992] gives an upper bound solution as compared with the (F.E) method. Cubicles of ribbed walls show higher blast resistance and exhibits smaller plastic support rotation of panels than that of flat-sided walls. The minimum thickness required to avoid using lacing reinforcement have been obtained for different cases of grillage arrangements and charge weights.

الخلاصة

في هذا البحث تم اقتراح تصميم لجدران خرسانية مسلحة لاستخدامها داخل المعامل لغرض الحماية من خطر الانفجارات الداخلية المحتملة، ولغرض تماشي استخدام التسليح المتعرج تم اقتراح نظام شبكي لتقليل الدوران اللـــدن عند المساند وتصميم اجزاء الجدار بين اعضاء الشبكة بشكل لدن وباقي الاعضاء بشكل مرن. وهذا من شانه ان يسهل الصيانة عند تعرض المنظومة للانفجار.اذ ان اعضاء الشبكة الرئيسية ستبقى ضمن حدو د المرونة.

اضهرت النتائج ان طريقة التحليل الديناميكي احادي الحركة تعطي نتائج اعلى من طريقة العناصر المحددة. وتم ايجاد اقل سمك للجدران يسمح بعدم استخدام التسليح المتعرج ولحالات مختلفة لشدة الانفجار

KEY WORDS

Blast loads, concrete Barriers, Chemical Plants.

INTRODUCTION

Some structures like shelters and chemical plants need to be designed to resist dynamic, as well as static loads. Safety provision may necessitate the use of blast-resistant cubical structures in such units. These structures are intended to mitigate the risk of accidental explosions in the surrounding working area. A major objective of this research is to propose a practical design for reinforced concrete cubicles to resist internal explosions without using lacing reinforcement, **Fig. (2a).**Shear

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THEORITICAL ESTIMATION OF STRENGTH OF OVER LAP JOINING OF SHEETS

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ABSTRACT

One of the main purposes of this study is to understande the reason of determining the standared of the parameters for overlap spot welding test, which is based on the thickness and overlap distances. The overlap joint is the most convential joining for the spot and riveting joint. The analysis of riveted and welded connection involves so many indeterminate factors that an exact solution is impossible. Nevertheless, by making certain simplifying assumption The most significant of these assumptions is that when the applied load passes through the centroid of the spotted region and the rotation angle will be small. By using the classical fracture theory, Misses and bending beam theory. The result which explain the behavior of the junction to the applied load, and to the rotational angle which depend on the yield strength of the base metal and on the maximum load of the welded joint. The different parameters were affected on the rotation of the welded joint and fracture load. Here, "failure" of the test sample is defined as the "fracture initiation", which corresponds to the peak load as discussed earlier.

Two theories were applied with simple assumptions which used to reach the final formula in which suitable for lap welded joint. Also the mechanism of fracture and initation of crack have been examined.

الخلاصة

ان احـــد الاهداف الاساسية من هذه الدراسة هو فهم الاسباب من تحديد المتغيرات والابعاد الخاصة لقطعة اللحـــام التراكبـــية الشكل بالاستناد على سمك ومسافة التراكب للعينات. تعتبر الاشكال التراكبيه من المقاطع المألوفة في عمليات اللحام النقطي وعمليات البرشمة. التحليل النظري للاحمال المسلطة على القطع المبرشمة والملحومة تتضمن متغيرات غير محددة والتي يكون معها التحليل غير ممكن الابعمل بعض الفرضيات التي تبسط التحليل. في هذا البحث اعتمد افتراض الحمل المسلط واقع على محور نقطة اللحام وافتراض ان مقدار زاويـــة الدوران تكون قليلة. من خلال استعمال فرضية فون- ميسس و فرضية العتبة المنحنية تم الحصول علـــى نـــتائج مبسطة توضح سلوك القطعة التراكبية وكذلك زاوية الالتواء نسبة الى الحمل المسلط و مقاومة الخضـــوع للقطعة المعدنية نفسها . تم وضع اشكال بيانية تبين تأثير المتغيرات المختلفة على زاوية الالتواء ودوران الوصـــلة وكذلك على حمل الكسر. تم توضيح ميكانيكية الكسر وكيفية بداية نشوء التشقق. تم تطبيق الفرضيتين اعلاه للوصول الى علاقة عامة للوصلات الملحومة تراكبيا . ان استخدام مصطلح الفشل في هذا

FORMULATION AND SIMPLIFICATION OF DATA INPUT AND OUTPUT FOR GROUP TECHNOLOGY TECHNIQUE IN CELLULAR MANUFACTURING SYSTEMS

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ABSTRACT

In most of the group technology approaches the formulation and simplification of data entry has been ignored. This has lead to difficulties and complexity for the end-user of the group technology, especially in the cases where the number of machines and components are large and complex. The way the data are inputted are in the form of a 0-1 matrix, which is quit difficult, troublesome, and error creation is possible in their entry, even with double-checking in their input. Also for output results, as it is given in the form of the 0-1 matrix and left to the end-user to interrupt instead of giving the result in a such a way that it could be used by the end-user directly.

In this paper, a systematic formulation of data input and output is introduced so as to make easier for the users to enter their data as simple as possible and with minimum error occurrence, especially in the cases where there are considerable number of machines and components to be dealt with. And also use the results directly without any further interpretation.

The proposed system for data entry and output interruption has been applied and then implemented in two different companies with easiness and apparition of end-user in terms of data input, minimum corrections, simple and direct usage of outputs without further interpretation.

الخلاصة

في معظم الدراسات الخاصة بتكنولوجيا لا يتم الاخذ بنظر الاعتبار تبسيط و برمجة ادخال المعلومات. ان ذلك ادى الى تصعيب و تعقيد الامور على المستعمل النهائي لمثل هذه الطرق، و خاصة في حالة كون عدد المكائن و الاجزاء كبير و معقد. ان ادخال المعلومات يكون اعتياديا على شكل مصفوفة (٠ – ١)، و الذي يكون في معظم الاحيان صعبا و ذات مشاكل معقدة و تحوي على بعض الاخطاء نتيجة الى الادخال الخطأ في المعلومات الخاصة بالاجزاء و المكائن بالرغم من التدقيق عند الادخال الى الحاسبة. و كذلك بالنسبة للنتائج، حيث انها ايضا تعطى كمصفوفة (٠ – ١) وتترك للمستعمل النهائي لترجمتها الى الواقع الحقيقي من مكائن و اجزاء و بالتالي صرف الوقت و الجهد الكثير على ذلك.

KEY WORDS
Study the Dispersion by using one dimension, model

INTRODUCTION

Fresh waters are facing an increasing load of disposal of polluted water due to the rapid growth of industrial and municipal activities as well as to increase of land drainage due to agricultural activities and land saltation. Outfall effluents with high pollutant concentrations and / or high salinity levels are discharged to fresh water causing near field and far field pollution conditions in the river [Petrus (1990)]. The total dissolve solids (TDS), chloride (CL^-) and sulphate ($So_4^=$) are used in this study as principle indicators of water quality variation in Diyala River from Diyala barrage to Tigris-Diyala confluence reach.

OBJECTIVES

1- Examine the concentration distribution along the river obtained from the numerical solution of one-dimensional flow for steady state conditions.
2- Specify the segment of the study reach in which the concentrations of pollutants in water exceed the allowable limits of irrigation water.
3- Locate the places of drains that affect water quality of the Diyala River.

Theoretical Background

One Dimensional Dispersion of Pollutants in River Flow

The diffusion - convection equation in its generalized one - dimensional form is [Blair (1980)]:

$$\frac{\partial c}{\partial t} + U\frac{\partial c}{\partial x} = D_l \frac{\partial^2 c}{\partial x^2} \quad \text{.....(1)}$$

Where:
C = concentration of pollutant, (M/L^3).
t = time coordinate, (T).
U= average velocity for the reach , (L/T).
X = space coordinate, (L).
DL= Longitudinal dispersion coefficient, (L^2/T).

Longitudinal Dispersion Coefficient

Samples are taken from difference depths and it is found that no obvious variation in constituent concentrations of (TDS), (CL^-) and ($SO_4^=$). Therefore, only longitudinal dispersion coefficient is taken into consideration.
Imara – Al-Thamiry (1997) presented dispersion coefficients as follows:

$$D_{I-TH} = \frac{U * T^2}{160 * R^{5/6} * n} \quad \text{.....(2)}$$

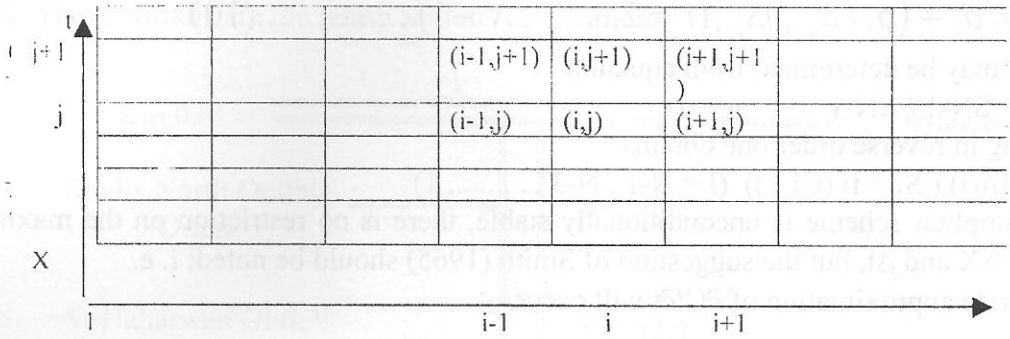
In which:
DI-TH = Imara–Al-Thamiry dispersion coefficient, (m^2/sec).
n = Manning's roughness coefficient, dimensionless.
U = average velocity, (m/sec).
R = hydraulic radius, (m).
T = Top width, (m).

Finite Difference Simulation

In the implicit method, the partial derivations of concentration are expressed in terms of unknown and known concentration differences.

This produces a system simultaneous of linear equations. Every equation has three unknown concentrations at time (j+1) and one to three known concentration of time (j). These equations must be solved simultaneously to find the concentration for time step (j+1) .One of the possible finite differences approximation of equation (1) is the Crank-Nicolson Scheme is;

There are three unknown concentrations and three known concentrations in equation above. The graphical representation of the system is shown in **Fig.(1).**



Fig(1) The Implicit Scheme

At the boundary point I = 1 and I = N one must have some information about C1 and CN and all time step levels and this is given by the boundary conditions. Separating the unknown values of equation from the know values, result in:

a(Ci-1,j+1) + b(Ci,j+1) + f(Ci+1,j+1)= a(Ci-1,j) + b(Ci,j) + f(Ci+1,j) ...(4)

Where the coefficients are given by [Razoky , (1984)] :

$$a = -D_L \frac{\Delta t}{\Delta X^2} - U \frac{\Delta t}{\Delta t} \quad \text{.....(5)}$$

$$b = 2\left(D_L \frac{\Delta t}{\Delta X^2} \right) + U . \frac{\Delta t}{\Delta X} + 2 \quad \text{.....(6)}$$

$$f = -D_L \frac{\Delta t}{\Delta X^2} \quad \text{.....(7)}$$

The matrix of coefficients for the simultaneous equations resulting from equations is tri-diagonal . It has only three non-zero terms per row, one on the main diagonal and one on either side of it. The resulting system of equations are solved by Gauss's elimination method as:

1- when there are N-1 interval mesh points along each time row , equation can be written very generally as :

$$-a_1 . C_o + b_1 C_1 - f_1 C_2 = d_1 \quad \text{.....(8a)}$$

$$-a_2 C_1 + b_2 C_2 - f_2 C_3 = d_2 \quad \text{.....(8b)}$$

$$-a_i C_{i-1} + b_i C_i - f_i C_{i+1} = d_i \quad \text{.....(8c)}$$

$$-a_{N-1} C_{N-2} + b_{N-1} C_{N-1} = dN - 1 \quad \text{.....(8d)}$$

Where a's, b's, f's and d's are known, C's is set by the boundary condition (generally taken as unity) from equation, C1 can be eliminated from the second equation, and the new second equation used to eliminate C2 from the second equation, and the new second equation used to eliminate C3 from the third equation above and so on.

2- from the equation above one can evaluate the value of αi, Si as follows:
With: α1 = b1, S1 = d1

$$\alpha_i = b_i - (a_i / \alpha_{i-1}) f_{i-1} (i = 2,3,....., N-1) \quad \text{.....(9)}$$

$$S_i = d_i + (a_i / \alpha_{i-1}) S_{i-1} (i = 2,3,....., N-1) \quad \text{.....(10)}$$

3- CN-1 may be determined from equation
CN-1 = SN-1 / αN-1

4- Solving in reverse order one obtains
Ci = (1/αi) (Si + fi (Ci-1)) (I = N-1 , N-3 , ..., 1)

As the implicit scheme is unconditionally stable, there is no restriction on the maximum spatial mesh size ΔX and Δt, but the suggestion of Smith (1965) should be noted; i. e.
Or inaccurate approximation of ∂C/∂t will occur.

$$\frac{D_L \Delta t}{\Delta X^2} \leq 1.0 \quad \text{.....(11)}$$

Where:
ΔX = distance increment (L)
Δt =time increment

Sources, Sinks, and Chemical Reactions

Equation (1) can be modified to allow for sources and sinks and for certain kinds of chemical reactions. To include sources or sinks , the term S is added to the right hand side of equation (1) . This term can be formulated mathematically in several ways, [Wang (1982)]. A simple and generalized form of this term used is expressed for conservative pollutants as follows
For conservative pollutants the first term in equation (12) can be neglected then:

$$S = C_p * \frac{q_S}{A} + \frac{C_p * Q_S}{\Delta X * A} \quad \text{.....(12)} \qquad S = \frac{C_p * Q_S}{\Delta X * A} \quad \text{..... (13)}$$

Where:
Qs= point source discharge, (L^3/T).
qs= non - point source discharge, ($L^3/T/L$).
A= Cross - sectional area, (L^2).
Cp= concentration of salts, (L^2/T).

Furthermore, the pollutants in equation (13) may consider as "continuous" or "discontinuous/puls" source depends on the operating rule of the drains or the nature of the pollutants in the river.
For explicit method the boundary condition for the second source is:

$C(\pm\infty, t)=0$ ...(14)
$C(X, 0) =0$ ...(15)
$C(X_2, t_2)=Ca_1+S$ ...(16)

Where:

Ca_1 = the concentration of the first source at the second source location
X_2 = distance between the first and second source respectively
t_2 = the time to start the effect of the second source .

Description of the Study Reach

Two hundred and three kilometers (203 km) length of the Diyala river was studied in this work, the reach of study starts from Diyala Barrage, and extended to the confluence of the Tigris – Diyala river .

Fig.(2) illustrated the scheme and the descritized form of the Diyala river system within the study reach. Seven outfalls were recorded and concerned as point sources of pollutants, which discharge to the river. These outfalls are the pump stations of the drains

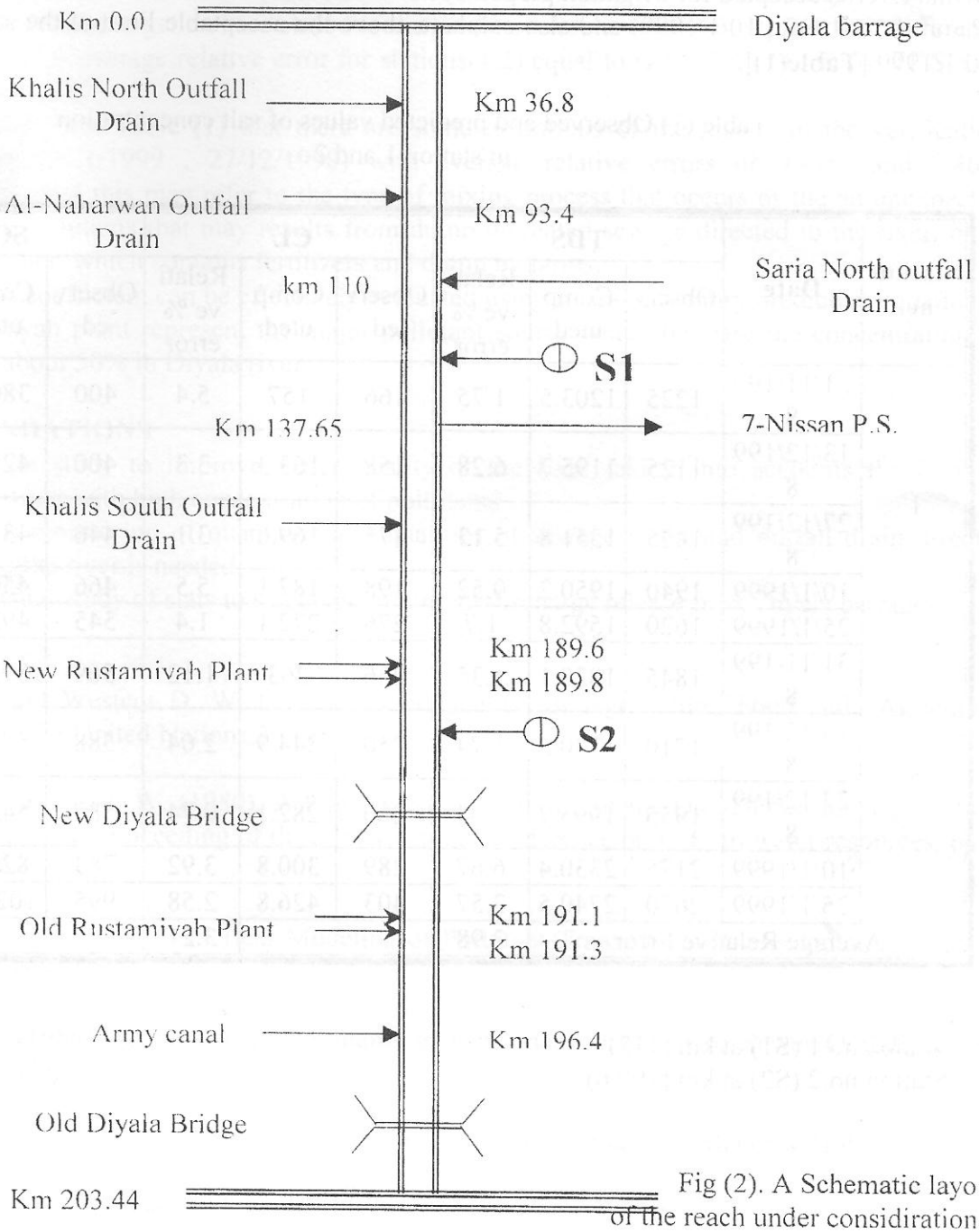


Fig (2). A Schematic layout of the reach under considiration.

Results and Discussion

It was found from the study of constituents of Diyala river water quality that total dissolved solids (TDS), chloride (CL^-), and Sulphate ($SO_4^=$) are present in significant concentrations, so they are selected for this study.

The model is based on the one-dimensional convective-dispersion equation for conservative substance, that was solved using implicit technique, and the model based on the gathered data, which recorded on (31/11/98) To (25/1/99), for TDS, CL and $SO_4^=$.

Calibration of the model is achieved by applying it to an independent set of data using the model and the results established the model validity,its applicability and the results are listed in Table (1) also for station (1) and station (2) respectively.

Table (2) represent the laboratory determinations needed to evaluate common irrigation water quality problems [Ayers, (1985)], and its seen from **Table (1),** that in general water quality in Diyala river is accepted for irrigation purposes, however (TDS) exceed the allowable limit at station (2) on (25/1/1999 . 10/1/1999) and also sulphate above the acceptable limit at the same station on 10/1/1999 **[Table(1)].**

Table (1) Observed and predicted values of salt concentration in station 1 and 2

Station no.	Date	TDS			CL^-			$SO_4^=$		
		Observed	Computed	Relative % error	Observed	Computed	Relative % error	Observed	Computed	Relative % error
1	31/11/1998	1225	1203.5	1.75	166	157	5.4	400	380.1	4.98
	13/12/1998	1125	1195.7	6.28	158	163.3	3.3	400	425.4	5.97
	27/12/1998	1425	1351.8	5.13	175	169.6	3.1	446	431.2	3.3
	10/1/1999	1940	1950.2	0.52	198	187.1	5.5	466	450.7	3.28
	25/1/1999	1620	1592.8	1.7	276	272.1	1.4	545	493.7	9.41
2	31/11/1998	1845	1820.1	1.35	266	263	1.12	569	575.6	1.15
	13/12/1998	1710	1740.3	1.74	250	244.9	2.04	588	571.1	2.87
	27/12/1998	1955	1995.7	2.04	280	282.1	0.74	587	543.2	7.46
	10/1/1999	2175	2330.4	6.67	289	300.8	3.92	783	820.1	4.52
	25/1/1999	2670	2740.5	2.57	403	426.8	2.58	995	1020.2	2.47
Average Relative Error				2.98			3.21			4.69

Note:

- Station no.1 (S1) at km (112)
- Station no.2 (S2) at km (190.6)

Table (2) Laboratory determinations needed to evaluate common irrigation water quality problems [Ayers, (1985)].

Water parameter symbol	Unit	Usual range in Irrigation water
TDS	mg/l	≤ 2000
CL^-	mg/l	≤ 1050
$SO_4^=$	mg/l	≤ 960

CONCLUSIONS

The following conclusions are drown on the basis of the result obtained from the model:

2- The observed data, in general are closed to the predicted results from the implicit finit difference method with an average relative error for stations(1,2) equal to (2.98, 3.21, 4.69) for TDS, CL, SO4 respectively.

3- It is noticed from Table (1) that there are some deviations of the results in the verification periods on (25/1/1999 , 27/12/1998) with average relative errors of 9.41% and 7.46% respectively, and this may refer to the type of mixing process that occurs or the an unexpected location of pollutants that may results from dump untreated sewage directed to the river, or to the drain water. which contains fertilizers and dump by farms.

4- Dispersion coefficient can be effectively evaluated using Imara-Althamiry predictive equation.

5- Al-Rustamiyah plant represent the major pollutant source which increase the concentration of salts with about 50% in Diyala river.

RECOMMENDATIONS

2- Optimization study to improve water quality of the river taking into accounts the outfalls discharge water with high concentration of pollutants.

3- Continuous monitoring of quantities and qualities of sewage water and outfall drain directly disposed to the river is needed.

4- Environmental study of slats to select the minimum discharge release from Diyala barrage.

REFERENCES

Ayers R. S., and Westcot D. W. (1985), Water Quality for Agriculture, Food and Agriculture Organization of the United Nations,29 Rev.1.

Blair E., and James M. W. (1980), A Finite Element Solution of the One-Dimensional Diffusion-Convection Equation, proceeding of third International conference on F. E. in water resources, pp.3-77 to 3-87.

Petrus G. B. (Oct, 1990), Numerical Modeling of Pollutant Transport in Rivers Including Density Effect. M. Sc. Thesis.

Razoky M. y. (1984), Dispersion of Pollutants in River near Drainage or Sewer Outfall, M. Sc. Thesis, Eng. College, Baghdad University.

Smith G. D. (1965), Numerical Solution of Partial Differential Equations, McGraw-Hill.

Wang H. F. (1982), Introduction to Groundwater Modeling, pp.174-198.