



شبكة المعلومات الجامعية

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ





شبكة المعلومات الجامعية



# شبكة المعلومات الجامعية

## التوثيق الالكتروني والميكرو فيلم

# جامعة عين شمس

التوثيق الالكتروني والميكرو فيلم

## قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها  
علي هذه الأفلام قد اعدت دون أية تغيرات



## يجب أن

تحفظ هذه الأفلام بعيداً عن الغبار

في درجة حرارة من 15 – 20 مئوية ورطوبة نسبية من 20-40 %

To be kept away from dust in dry cool place of  
15 – 25c and relative humidity 20-40 %



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# بعض الوثائق الأصلية تالفة



شبكة المعلومات الجامعية



بالرسالة صفحات  
لم ترد بالأصل

# **STUDY THE PERFORMANCE OF MICROTUBE AS AN EMISSION POINT IN MICRO-IRRIGATION SYSTEM**

**BY**

**BOSHRA LOUIZ BISHARA GIRGIS**

B. Sc. Agric. Sc. (Agric. Mech.), Menoufiya University, 1988

M. Sc. Agric. Sc. (Agric. Eng.), Menoufiya University, 1997

A Thesis Submitted in Partial Fulfillment

Of

The Requirements for the Degree of

**DOCTOR OF PHLOSOPHY**

In

**Agricultural Science**

**(Agricultural Engineering)**

Agricultural Engineering Department

Faculty of Agriculture

Cairo University

2005





## Approval sheet

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**This thesis for Ph. D. degree has been approved by:**

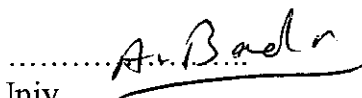
**Prof. Dr. Mahmoud Abdel-Aziz Hassan**

Prof. of Agric. Eng., Fac. of Agric., Zagazig Univ.



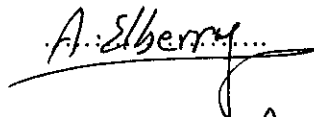
**Prof. Dr. Abd Allah El-Amin Badr**

Prof. and head of Agric. Eng., Fac. of Agric., Cairo Univ.



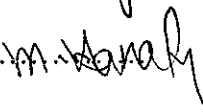
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Date of examination:     /     / 2005





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1. The first part of the document discusses the importance of maintaining accurate records of all transactions and the role of the accounting department in ensuring the integrity of the financial data. It emphasizes the need for transparency and accountability in all financial reporting.

2. The second part of the document outlines the various methods used to collect and analyze financial data, including the use of spreadsheets, databases, and specialized accounting software. It also discusses the importance of regular audits and the role of external auditors in verifying the accuracy of the financial statements.

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10. The tenth part of the document discusses the importance of financial ethics and the role of the accounting department in ensuring that all financial transactions are conducted in a fair and ethical manner. It outlines the various ethical issues that can arise in the financial industry and the importance of developing a strong ethical culture within the organization.

**Name of Candidate:** Boshra Louiz Bishara Girgis

**Degree:** Ph. D

**Title of Thesis:** The Performance of Microtube as an Emission Point in Micro-Irrigation System.

**Supervisors:** Prof. Dr. Mohamed Hanafy Hassan

Prof. Dr. Azmy Mahmoud El-Berry

Dr. Eng. Ahmed Rida Abu-Habsa

**Department:** Agricultural Engineering, Fac. of Agric., Cairo University.

**Branch:** Soil and water Engineering

**Approval:** / / 2005

### ABSTRACT

Studies were conducted to investigate the performance of microtube as an emission point in microirrigation system. The first one was to study the hydraulics of microtube emitters, to get a suitable empirical equation for predicting discharge rates, depending on the data of the experimental determination of these rates under different conditions. The second was to calculate the friction factor in polyethylene pipes applying Darcy-Weisbach equation. The third was to apply modeling techniques to form a simple model for designing single microirrigation lateral with the microtube as an emission device using the experimental data that was simulated the uniformity coefficient of water application.

The current investigation was carried out in Hydraulic National Lab of Agricultural Eng. Research Institute in Dokki, Giza. The first laboratory experiments were conducted to study the relationship between the parameters microtube diameter ( $d$ ), microtube length ( $l$ ), operating head ( $p$ ), lateral diameter ( $D$ ) and microtube discharge ( $q$ ) as estimated for turbulent flow conditions. A computer numerical analysis program (the least square method) was used to determine empirical equation (4.1) for flow rate of microtube diameters 3.15 and 4.3 mm as follows:

$$q = kp^a d^b l^c (d/D)^e \quad (4.1)$$

in which  $q$  = the discharge of the microtube (L/h);  $p$  = the pressure at entrance of microtube (bar);  $d$  = the inside diameter of microtube (mm);  $l$  = the length of microtube emitter (m);  $D$  = the internal diameter of lateral (mm); and  $k, a, b, c, e$  = the constants. The values of constants  $k, a, b, c$  and  $e$  are given as 2.8, 0.62, 2.54, -0.26 and -0.5 respectively. The equation has correlated the observed values with a correlation coefficient of 0.92. The microtubes length about of meter or less affects the discharge values for microtube (3.15 and 4.3 mm), and increasing of microtube length decreases the values of discharge. Each microtube diameter and lateral diameter has its effect on the microtube discharge. Increasing the ratio between microtube diameter and lateral diameter decreases the values of microtube discharge.

In the second laboratory experiments for evaluating the average friction factor, relative roughness and absolute roughness, these values were found 0.039081, 0.0063 and 0.084 mm respectively for the lateral size of 13.35 mm. The average friction factor, relative roughness and absolute roughness values were found 0.039074, 0.0073 and 0.118 mm for the lateral size of 16.15 mm. The average friction factor, relative roughness and absolute roughness values were found 0.037328, 0.005 and 0.09 mm for the lateral size of 18.2 mm. The Reynolds number was found to increase from 6376.8 to 16779.6 for the lateral size of 13.35 mm with increase in the flow velocity from 0.45 to 1.2 m/s. The Reynolds number was found to increase from 8971.6 to 21613.3 for the lateral size of 16.15 mm with increase in the flow velocity from 0.523 to 1.26 m/s. The Reynolds number was found to increase from 11327.2 to 26947.8 for the lateral size of 18.2 mm with increase in the flow velocity from 0.586 to 1.39 m/s. The total range of Reynolds number was found to be on the side of the turbulent range for the microirrigation lateral sizes of 13.35, 16.15 and 18.2 mm. The measured and calculated pressure drop is highest for small lateral diameter 13.35 mm and that with increasing of lateral diameter the measured and calculated pressure drop will decrease.

A computer model for designing single microirrigation lateral with the microtube as an emission device was constructed to evaluate the Christiansen's uniformity coefficient.

*m. el-berry*

