QISHLOQ XO‘JALIGI MAHSULOTLARINI ISHLAB CHIQARISH SAMARADORLIGINI OSHIRISHDA INNOVATSION TEXNIKA VA TEXNOLOGIYALARDAN FOYDALANISHNING MUAMMOLARI VA ISTIQBOLLARI

RESPUBLIKA ILMIY-AMALIY ANJUMANI MAQOLALAR VA TEZISLAR TO‘PLAMI

2024-yil 3-4-may

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OLIY TA’LIM, FAN VA INNOVATSIYALAR VAZIRLIGI

QARSHI MUHANDISLIK-IQTISODIYOT INSTITUTI

QISHLOQ XO‘JALIGI MAHSULOTLARINI ISHLAB CHIQARISH SAMARADORLIGINI OSHIRISHDA INNOVATSION TEXNIKA VA TEXNOLOGIYALARDAN FOYDALANISHNING MUAMMOLARI VA ISTIQBOLLARI

RESPUBLIKA MIQYOSIDAGI ILMIY-AMALIY ANJUMANI MAQOLALAR VA TEZISLAR TO‘PLAMI

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“Qishloq xo’jaligi mahsulotlarini ishlab chiqarish samaradorligini oshırishda innovatsion texnika va texnologiyalardan foydalanishning muammoları va istiqbollari” mavzusidagi Respublika miqyosidagi ilmiy-amaliy anjumani maqolalar va tezislar to‘plami

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Ushbu to‘plam Qarshi muhandislik-iqtisodiyot institutida 2024-yil 3-4 may kunlari o‘tkazilgan “Qishloq xo’jaligi mahsulotlarini ishlab chiqarish samaradorligini oshirishda innovatsion texnika va texnologiyalardan foydalanishning muammolari va istiqbollari” mavzusidagi respublika ilmiy-texnik anjumani ma’ruzalari asosida tayyorlangan.

To‘plamga kiritilgan maqolalarda yerga ishlov berishning resurstejamkor yangi texnika va texnologiyalarni ishlab chiqish, O‘zbekiston tuproq iqlim sharoitiga mos kartoshka yetishtirish mashinalari va texnologiyalarini yaratish, tuproqni ekishga tayyorlash jarayonini mexanizatsiyalashtirish hamda suvni tejashdagi mavjud muammolar va ularning ilmiy yechimlari kabi masalalar qamrab olingan.

Mas’ul muharrirlar:

t.f.d., prof. F.M.Mamatov

t.f.f.d., dots.A.Z.Kiyamov

t.f.n., dots. T.X.Razzakov

t.f.f.d. N.Sh.Rashidov

t.f.f.d. G‘.X.Ergashov

TABRIK SO‘ZI

Hurmatli anjuman qatnashchilari!

Keyingi yillarda mamlakatimiz qishloq xo‘jaligini isloh qilish, qishloq xo‘jaligi mahsulotlarini yetishtiruvchi, qayta ishlovchi va sotuvchi subyektlar o‘rtasidagi munosabatlarning huquqiy asosini mustahkamlash, sohaga investitsiyalarni jalb qilish, resurstejamkor texnologiyalarni joriy etish hamda qishloq xo‘jaligi mahsulotlari ishlab chiqaruvchilarni zamonaviy texnikalar bilan bilan ta’minlash borasida muayyan ishlar amalga oshirilmoqda.

Jahonda tuproqni ekishga tayyorlash va ekish ishlarida energiya-resurstejamkor hamda ish unumi yuqori bo‘lgan mashinalarni qo‘llash yetakchi o‘rinlardan birini egallamoqda. Bir yo‘la tuproqqa ishlov berish, o‘g‘it solish, sug‘orish arig‘ini shakllantirish va ekish texnologik jarayonlarini bajaradigan kombinatsiyalashtirilgan agregatlarni ishlab chiqarishni o‘zlashtirish va ulardan qishloq xo‘jaligi mahsulotlarini ekishda foydalanish muhim ahamiyat kasb etadi.

Respublikamizda qishloq xo‘jaligi mahsulotlarini yetishtirishda mehnat va resurs sarfini kamaytirish, resurslarni tejash, yerlarni ilg‘or texnologiyalar asosida ekishga tayyorlash va yuqori unumli qishloq xo‘jaligi mashinalarini ishlab, dalalarni ekinlarni ekishga tayyorlash va urug‘ ekishda kam mehnat va resurs sarflab, barcha texnologik jarayonlarni sifatli bajarilishini ta’minlaydigan texnika vositalarini ishlab chiqish yuzasidan keng qamrovli chora-tadbirlar amalga oshirilib, muayyan natijalarga erishilmoqda. O‘zbekiston Respublikasini yanada rivojlantirish bo‘yicha Harakatlar strategiyasida, jumladan “...qishloq xo‘jaligini modernizatsiya qilish va jadal rivojlantirish uchun sug‘oriladigan yerlarning meliorativ holatini yanada yaxshilash, melioratsiya va irrigatsiya obyektlar tarmoqlarini rivojlantirish, qishloq xo‘jaligi ishlab chiqarishi sohasida intensiv usullarni, eng avvalo, suv va resurslarni tejaydigan zamonaviy agrotexnologiyalarni joriy etish, unumdorligi yuqori bo‘lgan qishloq xo‘jaligi texnikasidan foydalanish” vazifalari belgilab berilgan.

Institut olimlari tomonidan ilmiy izlanishlar natijasida resurs tejamkor texnologiyalar, masalan, energiyatejamkor ikki yarusli yumshatkich, tuproqni poliz ekinlari ekish uchun tayyorlaydigan kombinatsiyalashgan agregat, mineral o‘g‘itlarni o‘simlik ildiz tizimi rivojlanadigan hududga qavatlab soluvchi kombinasiyalashgan agregat, nishabli dalalarga ishlov beradigan va don ekadigan mashinalar ish organlari yaratildi va ishlab chiqarishga joriy etish uchun tavsiya etildi.

Bugungi o‘tkazilayotgan “Qishloq xo‘jaligi mahsulotlarini ishlab chiqarish samaradorligini oshirishda innovatsion texnika va texnologiyalardan foydalanishning muammolari va istiqbollari” mavzusidagi Respublika ilmiy-texnik anjumanining asosiy maqsadi qishloq xo‘jaligi sohasini rivojlantirishda chuqur nazariy, hamda innovatsion tadqiqotlar olib borish bo‘yicha fikr almashish, tayyorlanayotgan yosh kadrlarni ushbu sohada erishilgan yutuqlar, olib borilayotgan ilmiy tadqiqotlar bilan yaqindan tanishtirish va ularni bu sohaga jalb qilish asosida yuqori malakali kadrlarni tayyorlashga qaratilganligi bilan ahamiyatlidir.

Anjuman Respublikamizda mazkur soha bo‘yicha olib borilayotgan ilmiy-tadqiqot ishlarini muvofiqlashtirishni yanada yaxshilashga, olimlar o’rtasidagi ilmiy-ijodiy sohadagi uzviy aloqalarni yanada mustahkamlashga xizmat qiladi, degan umiddaman.

O‘ylaymanki, ushbu ilmiy-texnik anjumanda keyingi yillarda mazkur sohada olib borilgan ilmiy-tadqiqot natijalari muhokama etiladi va zarur tavsiyalar ishlab chiqiladi.

Bugungi anjumanni ko‘tarinki ruhda o‘tishini va yoshlarimizga ushbu anjuman doirasida bo‘lib o‘tadigan muloqotlarda faol bo‘lishlarini istab qolaman.

Anjuman ishiga muvaffaqiyat tilayman!

O.Sh.Bazarov

Qarshi muhandislik-iqtisodiyot instituti rektori

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CALCULATION OF THE FRICTION PARAMETER IN THE UNSTEADY FLOW BORDER LAYER

A.R.Rakhimov- associate professor, **D.D.Dilshodova**-junior teacher, **N.J.Raimova** - junior teacher, **S.Kh.Kulmatov**-master's student, **I.O.Sattorov**, master's student, **A.R.Khazratov**-master's student

Karshi engineering-economics institute

Abstract. The paper proposes empirical relationships for calculating the friction parameter of a non-stationary turbulent boundary layer, which is crucial for earth channel construction, based on the findings of the literature study.

Keywords: pressure, non-stationary flow, transport alluvium, turbulent, nonlinear components, fundamental, Reynolds turbulent pulsation, erosion.

The subject of how to shape the non-stationary turbulent border layer takes precedence when deciding on issues related to the transport alluvium prediction in the presence of various wave motion types. Because of this, it is not by accident that the study of erosion processes related to wavy flow usually starts with an examination of the structured particularities of the border layer, which currently has a primarily turbulent nature in its natural state. This is because the border layer has seen enough advancements in recent years thanks to fundamental research conducted by some authors [1,2]. However, given the increased mathematical complexity of characterizing the boundary layer shaping process in the context of oscillatory motion, there are currently some gaps in the literature that merit attention. These gaps are primarily in the area of trustworthy quantitative parameter estimation for the non-stationary layers, which is crucial in determining the accuracy of design choices made during hydrotechnical construction.

The majority of events and the border layer's current mathematical model are based on equations that were approved following a series of generalized Navier-Stoks equations that were simplified. These equations take the following forms:

$$\frac{\partial u}{\partial t}+u\frac{\partial u}{\partial x}+w\frac{\partial u}{\partial t}=-\frac{1}{\rho}\frac{\partial p}{\partial x}+v\frac{\partial^2 u}{\partial z^2}, \tag{1}$$

$$\frac{\partial u}{\partial x}+\frac{\partial w}{\partial z}=0, \tag{2}$$

Where *P* - stands for pressure, *V* - for the kinematic component of viscosity, and *p* - for the particular density of water. *u* and *w* correspond to vector velocities in the boundary layer along the *X* and *Z* axes.

Typically, the circumstance at the border fulfills:

$$u=w=0 \;\; under \;\; z=0; \quad u=\vartheta(x,t) \;\; under\, z=\infty. \tag{3}$$

The Prandtl equations for the boundary layer are found in systems (1) through (3). The system (1) - (3) is mutated under non-stationary conditions when motion is oscillatory and it is necessary to account for increased Reynolds turbulent pulsation.

$$\frac{\partial u}{\partial t}+u\frac{\partial u}{\partial x}+w\frac{\partial u}{\partial t}=-\frac{1}{\rho}\frac{\partial p}{\partial x}+\frac{\partial u}{\partial z}V_*\frac{\partial u}{\partial z}, \tag{4}$$

$$\frac{\partial u}{\partial x}+\frac{\partial w}{\partial z}=0, \tag{5}$$

The state of the boundary.

$$u=w=0 \; under \; z=z_0; \; u=\vartheta(x,t) \; under \; z=z_0+\delta, \tag{6}$$

Where V_* is the turbulent viscosity's kinematic factor. $z_0=K_s/30$ is the zero velocity level; K_s - is the Nikuradze-equivalent roughness height; δ - is the border thickness underneath the layer. $\vartheta(x,t)$ is the external current's velocity, which is not viscous and is correlated with the boundary layer pressure:

$$-\frac{1}{\rho}\frac{\partial p}{\partial x}+\frac{\partial \vartheta}{\partial z}+\vartheta\frac{\partial \vartheta}{\partial x} \tag{7}$$

Combining (4) and (7) yields the main system of equations for motion in a non-stationary boundary turbulent layer:

$$\frac{\partial u}{\partial t}+u\frac{\partial u}{\partial x}+w\frac{\partial u}{\partial z}=\frac{\partial \vartheta}{\partial t}+\upsilon\frac{\partial \vartheta}{\partial x}V_*\frac{\partial u}{\partial z}, \tag{8}$$

$$\frac{\partial u}{\partial x}+\frac{\partial w}{\partial z}=0 \tag{9}$$

Systems (8) and (9) often bring this characteristic to light in light of tiny vertical diameters of the boundary layer and little action of the at the bottom of the nonlinear components.

$$\frac{\partial u}{\partial t}=\frac{\partial \vartheta}{\partial t}+\frac{\partial}{\partial z}V_*\frac{\partial u}{\partial z} \tag{10}$$

$$\frac{\partial u}{\partial x}+\frac{\partial w}{\partial z}=0 \tag{11}$$

Numerous scholars have examined systems of this (or similar types) already. The following might be said to as the majority existent theory's qualitative defect:

1. They do not account for turbulent viscosity non-stationary variables.
2. The border layer's thickness was determined independently of the immensity's time.
3. A sinusoidal change in tangential tension was assumed.

Without getting into the mathematical specifics of the current border layer models, it is important to note the following: in each of the listed theoretical developments, attempts were made (with varying degrees of success) to determine the dependencies between the most significant alluvium transport values, represented by the parameter of friction $f=2u_{*m}^2/u_m^2$ (where u_{*m} represents the maximum importance of dynamic velocity in wavy flow and u_m represents the maximum importance of the orbital velocity of the external edge turbulent border layer). Here, in the sequence of events as they were previously discussed, the researcher was able to get the dependencies, which reside in sufficient excellent accordance with the experimental data (fig.1).

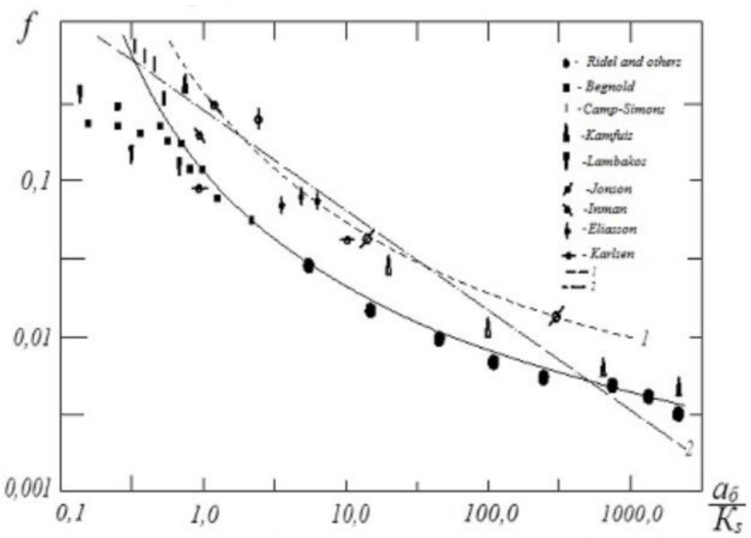

Fig. 1. Dependency curve *f=fct(a$_\delta$/K$_S$)*. 1. Kajiura curve (1968); 2. Jonson curve (1976)

But in our opinion, this correspondence is insufficient to create trustworthy techniques for predicting the transport alluvium under wave conditions. The goal of our study is to generalize existing laboratory and natural facts in order to obtain a sufficiently trustworthy dependence for the calculation of the parameters of friction. The problem of the transport alluvium in wavy flow u_{*m} is the most crucial factor in this decision-making process.

Following an examination of contemporary literature [3], 51 measurements of the variation in the parameter *f* and $a_\delta = K_S$ (where $a_\delta = u_m / w$) were obtained. $f = fct(a_\delta / K_S)$, which is presented in Figure 1 and, in our opinion, appears to be helpful based on previously obtained analytical correlations. In order to facilitate practical application, the connection was precisely estimated to a 2% series of dependencies in the following manner:

$$200 < \frac{a_\delta}{K_s} \qquad f = 0,05\left(\frac{a_\delta}{K_s}\right)^{-0,308} \tag{11.a}$$

$$25 < \frac{a_\delta}{K_s} \le 200 \qquad f = 0,105\left(\frac{a_\delta}{K_s}\right)^{-0,444} \tag{11.b}$$

$$2,5 < \frac{a_\delta}{K_s} \le 25 \qquad f = 0,204\left(\frac{a_\delta}{K_s}\right)^{-0,650} \tag{11.c}$$

$$0,4 < \frac{a_\delta}{K_s} \le 2,5 \qquad f = 0,279\left(\frac{a_\delta}{K_s}\right)^{-0,978} \tag{11.d}$$

$$\frac{a_\delta}{K_s} \le 0,4 \qquad f = 0,214\left(\frac{a_\delta}{K_s}\right)^{-1,270} \tag{11.e}$$

When calculating the transport alluvium during erosion processes under wind wave conditions, the dependencies (11a)–(11d) can be used.

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