

Toshkent irrigasiya va meliorasiya instituti
Fizika va kimyo kafedrası

Mavzu:

SUYUQLIK GIDRODINAMIKA

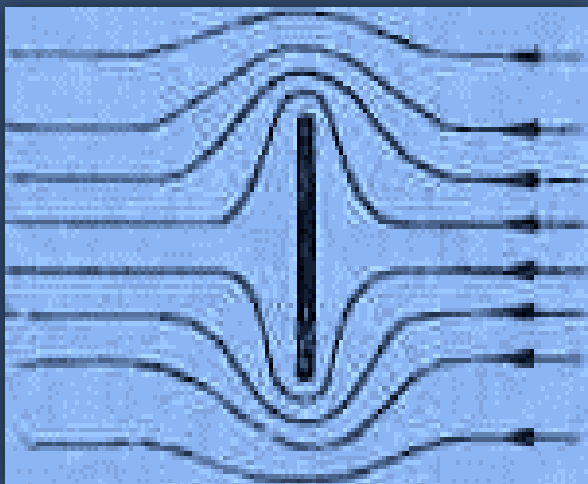
REJA:

- ✓ **1. GIDRODINAMIKANING ASOSIY TUSHUNCHALARI**
- ✓ **2. BERNULLI TENGLAMASI**
- ✓ **3. GIDRAVLIK ENERGIYA**
- ✓ **4. SUYUQLIK VA YOPISHQOQLIKNING ISHQALANISH BILAN OQISHI**
- ✓ **5. CHEGARA QATLAM VA UYURMA HOSIL BO'LISHI. TORBULENT OQIMINING TUZILISHI**

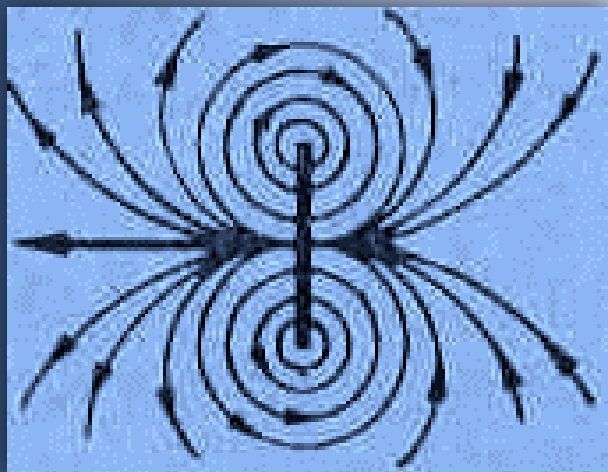
Gidrodinamika

- ✓ Suyuqliklarning harakat qonunlarini;
- ✓ Xarakatdagi suyuqlik o'ziga botirilgan jismlarga qanday kuchlar bilan ta'sir ko'rsatishini o'rganadi.

Mutlaqo yopishmaydigan va siqilmaydigan suyuqlik **ideal suyuqlik** deyiladi.



Ichiga tushirilgan plastinkani aylanib oqayotgan suyuqlik. Plastinkaga nisbatan tinch turgan kuzatuvchiga ko'rinadigan manzara

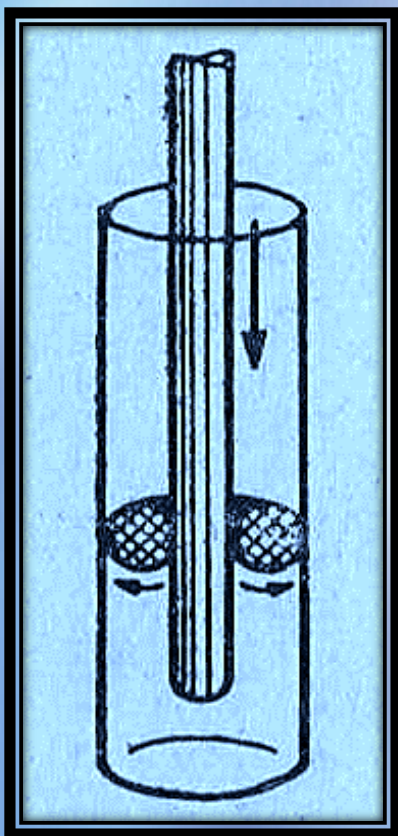


Suyuqlikka nisbatan tinch turgan kuzatuvchiga ko'rinadigan manzara.

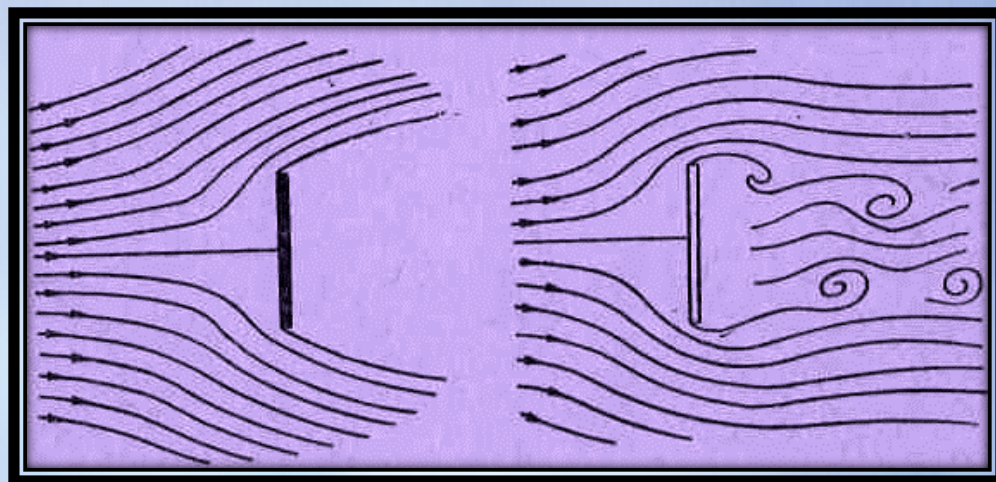


Leonard Euler
(1707-1783)

Peterburg akademigi Leonard Eyler nazariy gidrodinamikaning yaratuvchisi ekanligini dunyo miqyosida hamma tan olgan. Nazariy gidrodinamikaning ideal suyuqliklardagi uyurmali harakatini tekshirishga bag'ishlangan bo'limini Gelmgolts bilan Tomson ishlab chiqqan.



Suyuqlikning
xalqasimon uyurma
harakatini
tushuntiruvchi model



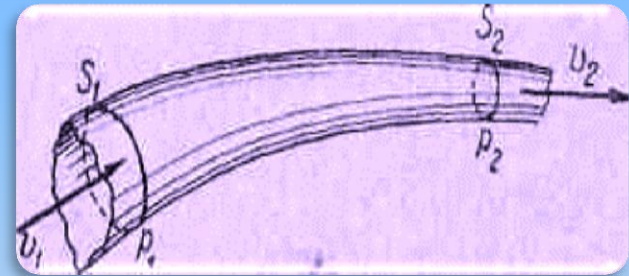
Plastinka yonidagi
uzlukli potensial
oqish

Plastinkani aylanib
oqish vaqtidagi
haqiqiy manzara

Bernulli tenglamasi

✓ Siqilmaydigan va noyopishqoq suyuqlik tezligining oqim nayining ko'ndalang kesimiga ko'paytmasi o'zgarmas kattalikdir.

1 sekundda oqim nayining bir uchidan oqib kirayotgan suyuqlikning hajmi uning qarama-qarshi uchidan oqib chiqayotgan suyuqlikning hajmiga teng bo'lishi kerak:



$$V_1 S_1 = V_2 S_2$$

$$V * S = \text{const.}$$

$$mv_1^2/2 + mgh$$

T vaqtda S1 ko'ndalang kesim orqali uzatiladigan energiya uchta qo'shiluvchidan iborat bo'ladi:

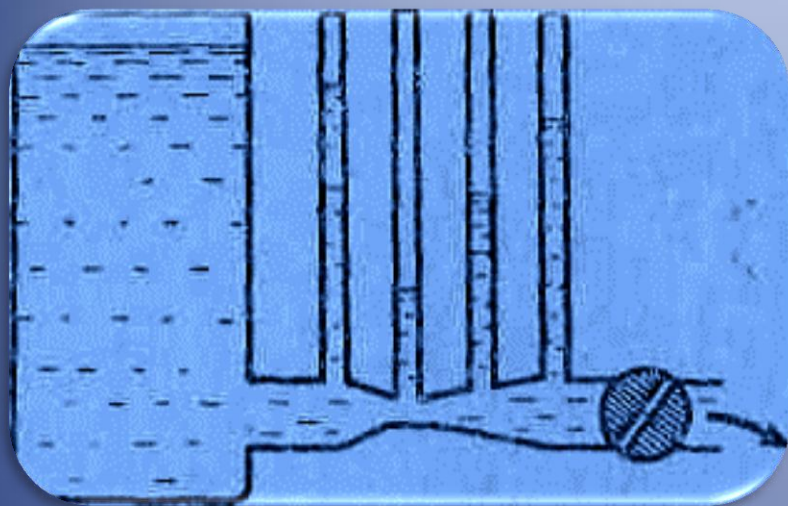
$$\frac{mv_1^2}{2} + mgh_1 + p_1 S_1 v_1 \Delta t.$$

$$\frac{mv_1^2}{2} + mgh_1 + p_1 S_1 v_1 \Delta t = \frac{mv_2^2}{2} + mgh_2 + p_2 S_2 v_2 \Delta t.$$

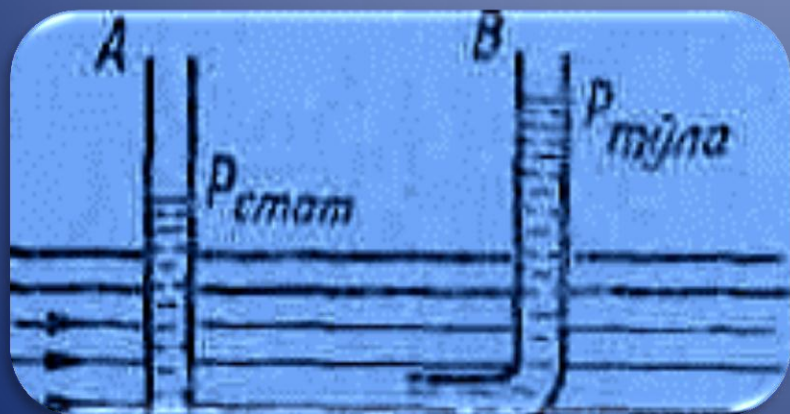
$$S_1 v_1 t = S_2 v_2 t$$

Bernulli tenglamasi:

$$\frac{\rho v_1^2}{2} + p_1 + \rho gh_1 = \frac{\rho v_2^2}{2} + p_2 + \rho gh_2.$$

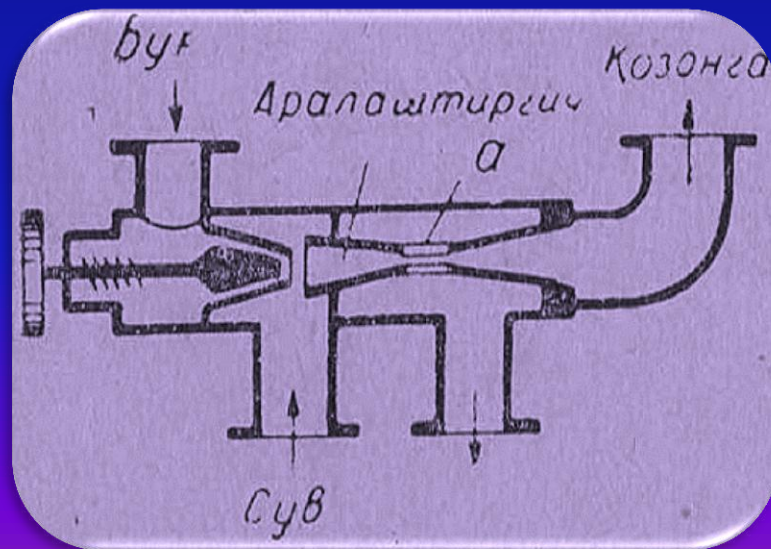


Bernulli tenglamasiga binoan nayning qisilgan qismlaridan bosimga qaraganda kamroq bo'ladi

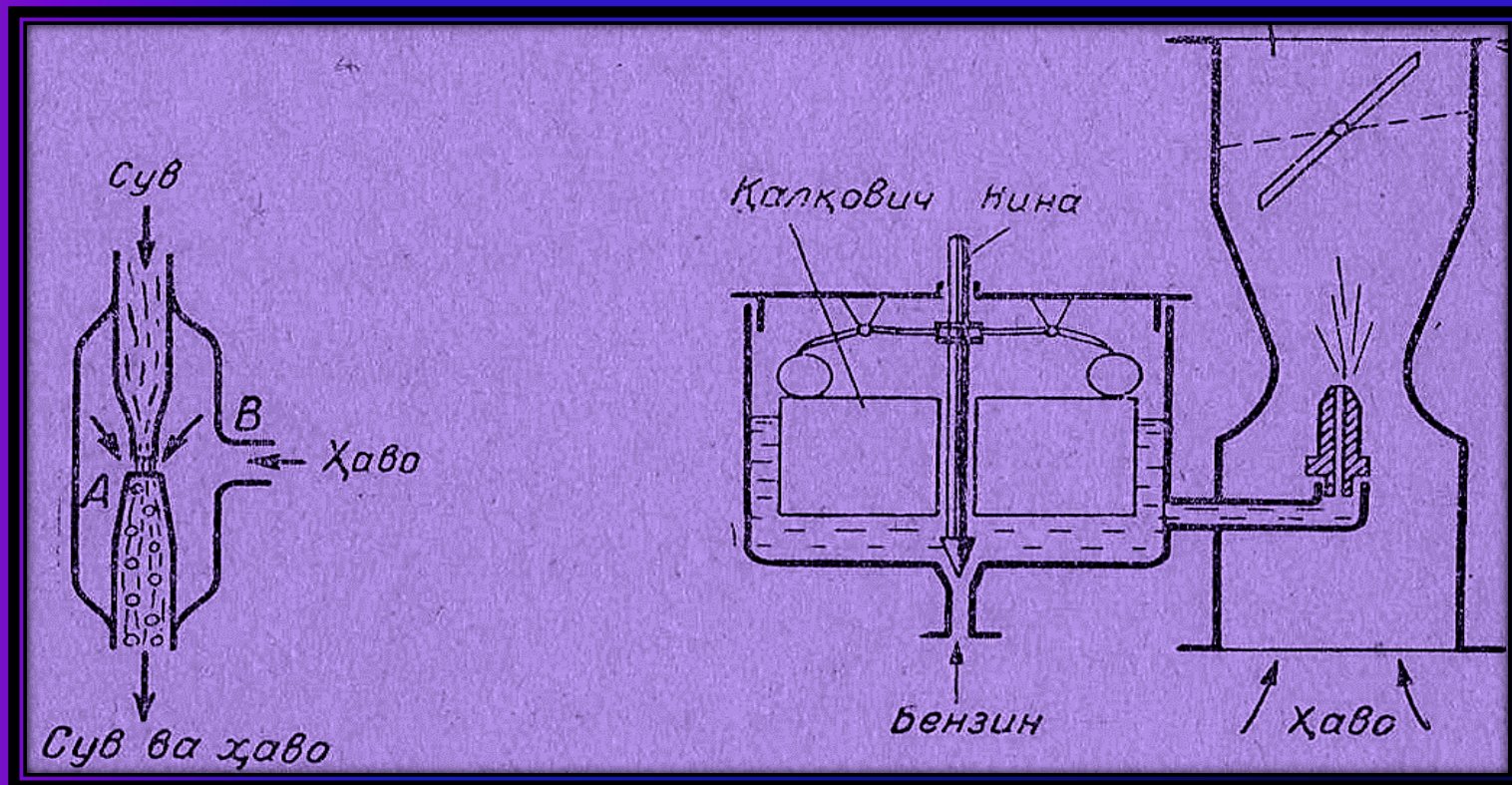


Statik (A) va to'liq (B) bosimlarni o'lchashda manometrik naychalarning joylashishi

Agar nayning keng qismidagi bosim atmosfera bosimiga teng bo'lsa, uning tor qismidagi bosim atmosfera bosimidan kam bo'ladi. Ko'p qurollarning (injektorning) ishlash prinsipi shu hodisaga asoslangan



Suv sharrali nasos va karbyurator

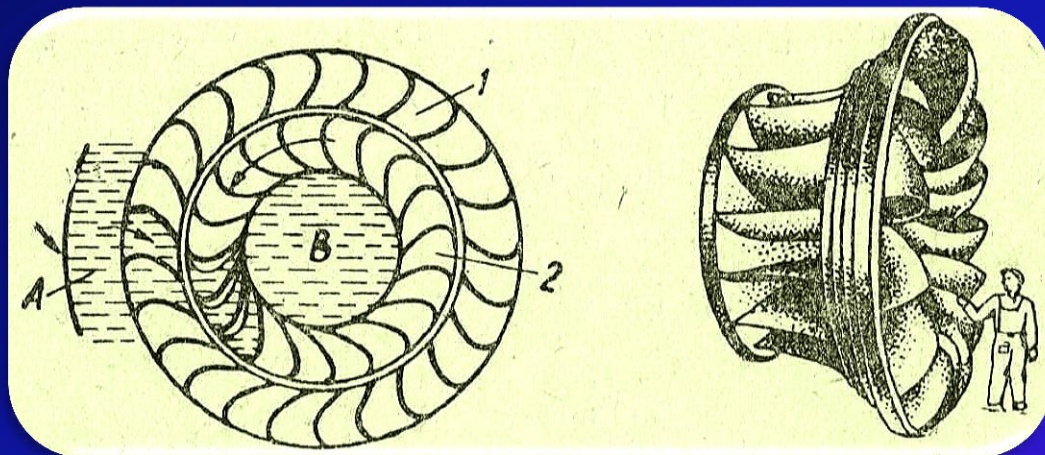


Gidravlik energiya

$$E = \frac{mv_0^2}{2} - \frac{mv_0'^2}{2}$$

$$P_{\text{максимал}} = \eta \frac{100QH}{75} \text{ о. к.}$$

Kurakcha bajaradigan ish oqim tezligining yarmiga teng bo'lgan oraliq tezlik bilan harakatlanganda eng katta bo'ladi.



1-bosimli turbinaning yo'naltiruvchi g'ildiragi, 2-ish g'ildiragi

Erkin sharrali turbinaning sxemasi va ish g'ildiragi

