

Vežba 6
ODREĐIVANJE PROTOKA
PREKO MERENOG PROFILA
BRZINA

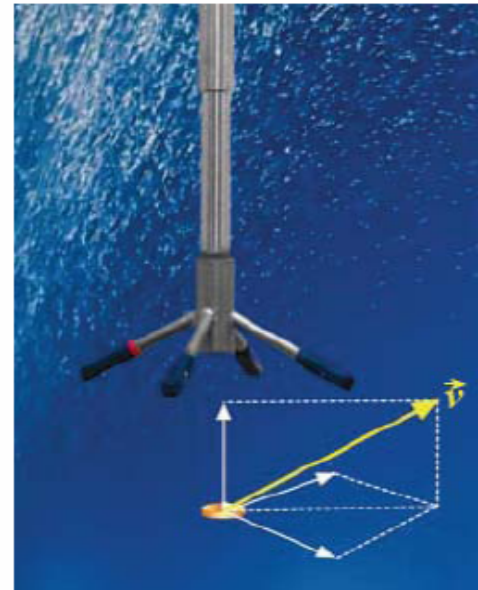


- Predstavljamo nove generacije senzora za merenje brzine vode u 3 dimenzije - 3D



PRINCIP RADA SONDE

- Sonda radi po principu **Doplerovog efekta**



SPECIFICATIONS

WATER VELOCITY MEASUREMENT

Range: $\pm 0.01, 0.1, 0.3, 1, 2, 4$ m/s (software selectable)

Accuracy: $\pm 0.5\%$ of measured value ± 1 mm/s

Sampling rate (output) 1–25 Hz, 1–200 Hz (Vectrino⁺ firmware only)

Internal sampling rate: 200–5000 Hz

SAMPLING VOLUME

Distance from probe: 0.05 m

Diameter: 6 mm

Height (user selectable): 3–15 mm

DOPPLER UNCERTAINTY (noise)

Typ. uncertainty at 25 Hz: 1% of velocity range

SPECIFICATIONS

ECHO INTENSITY

Acoustic frequency: 10 MHz
Resolution: 0.45 dB
Dynamic range: 60 dB

SENSORS

Temperature Range: -4°C to 40°C
Accuracy/Resolution: 1°C / 0.1°C
Time response: 5 min

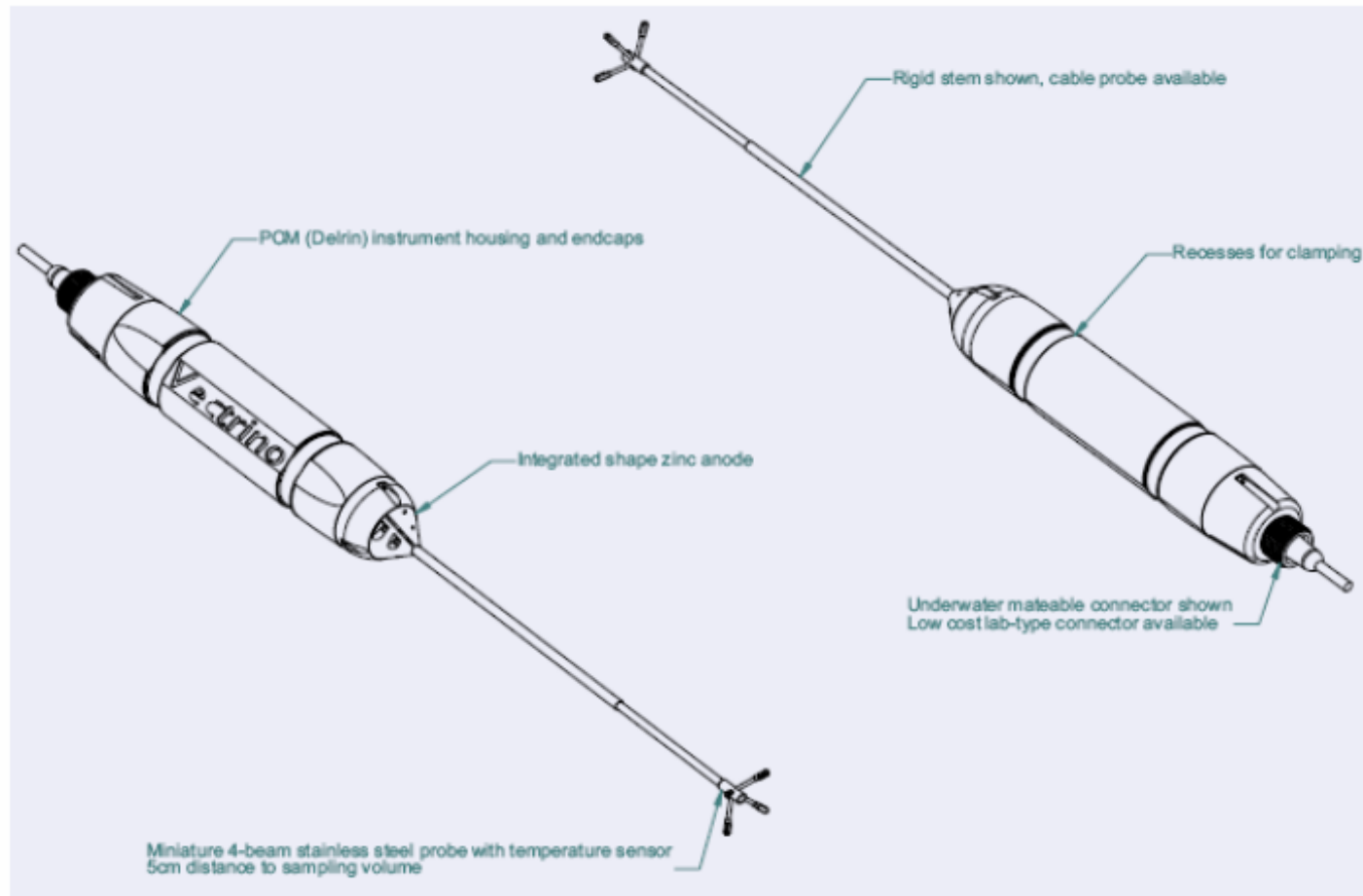
ENVIRONMENTAL

Operating temperature: -5°C to 45°C
Storage temperature: -15°C to 60°C
Shock and vibration: IEC 721-3-2

SOFTWARE (VECTRINO)

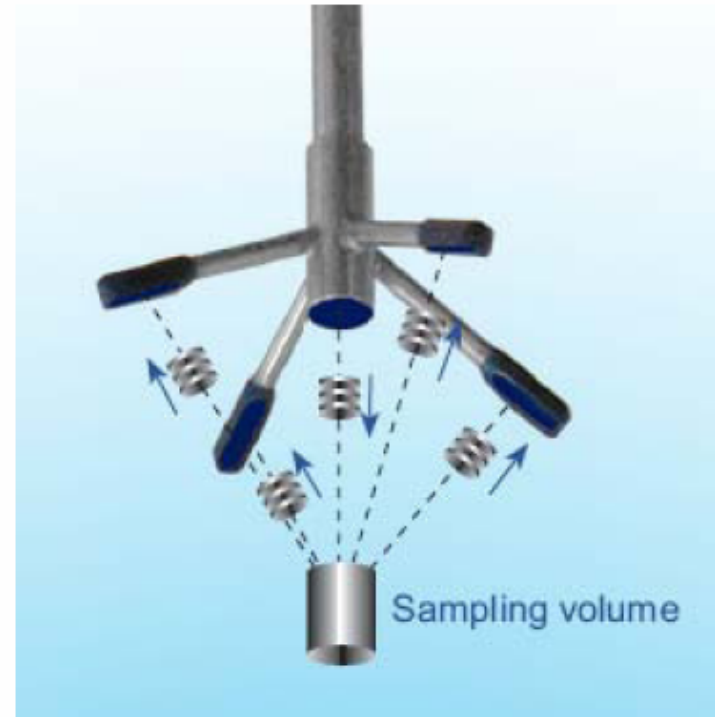
Operating system: Windows[®]98, Windows NT[®] 4.0,
Windows[®]2000, Windows[®]XP

TEHNIČKI OPIS

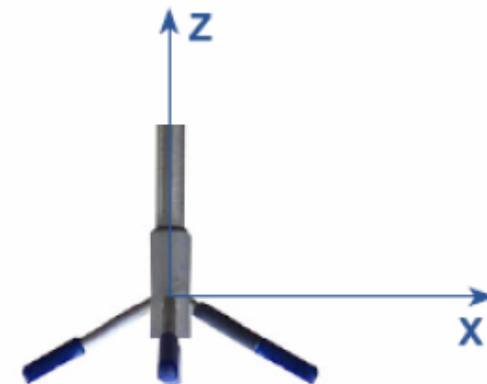
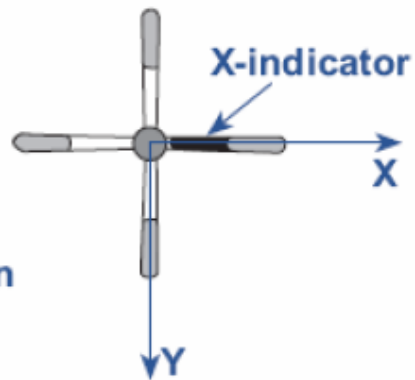
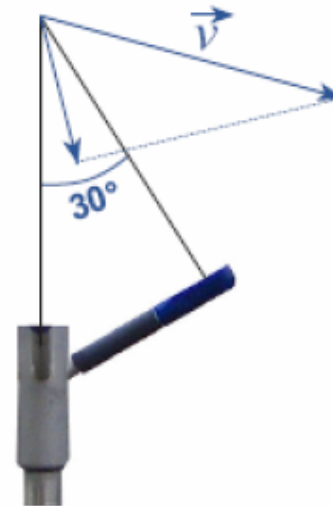
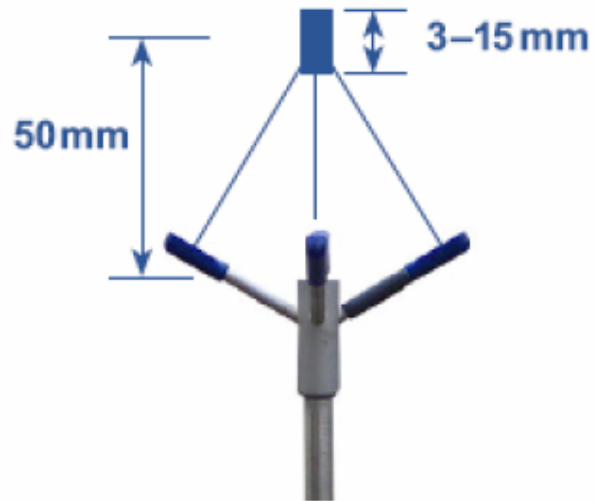


OPERATIVNI PRINCIP

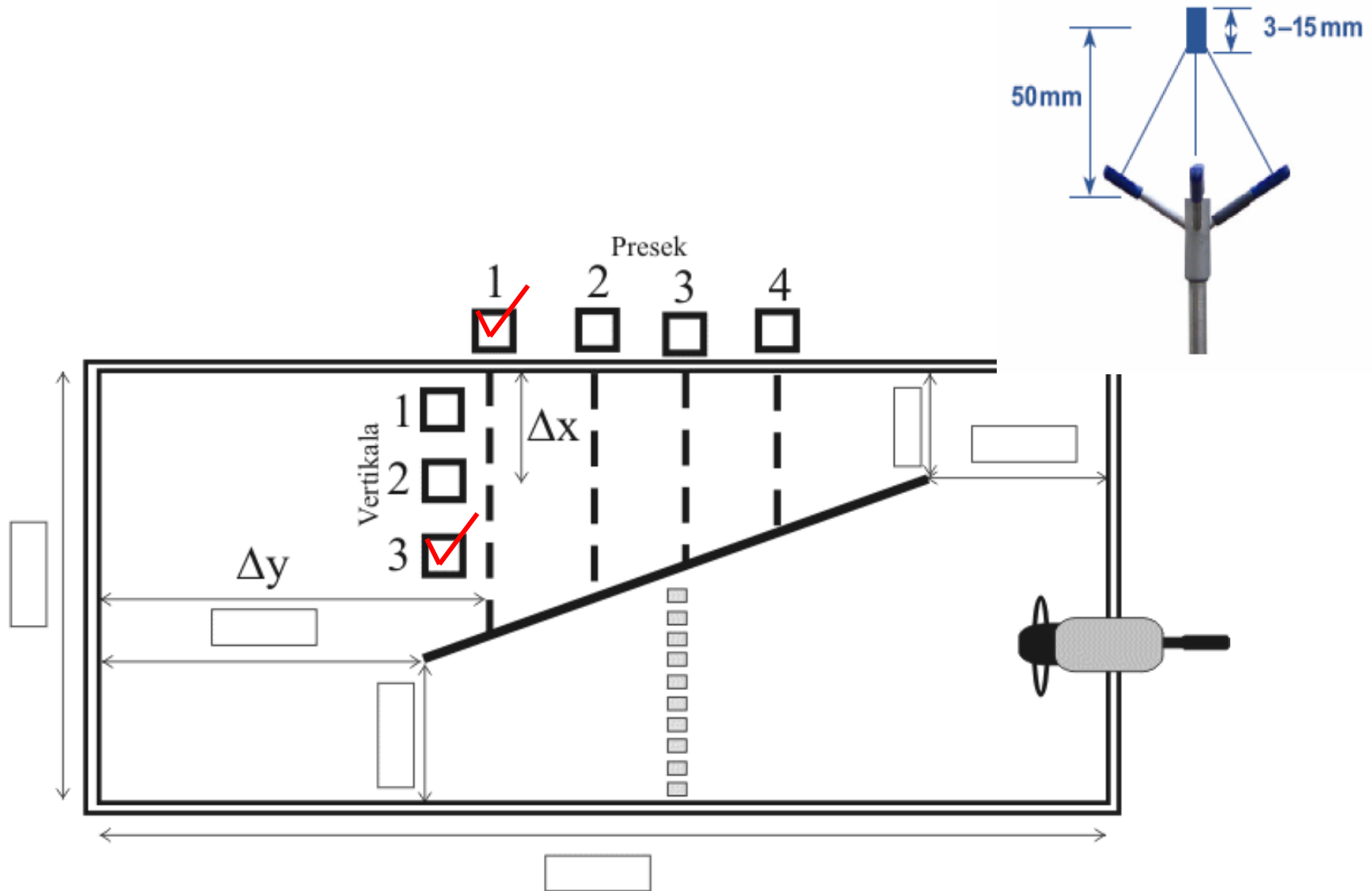
- Emituju se zvučni talasi od 10 MHz
- Zvučni talasi se odbijaju od suspendovanih čestica koje se nalaze u vodi
- Receiveri prihvataju eho



GEOMETRIJA



Merna instalacija



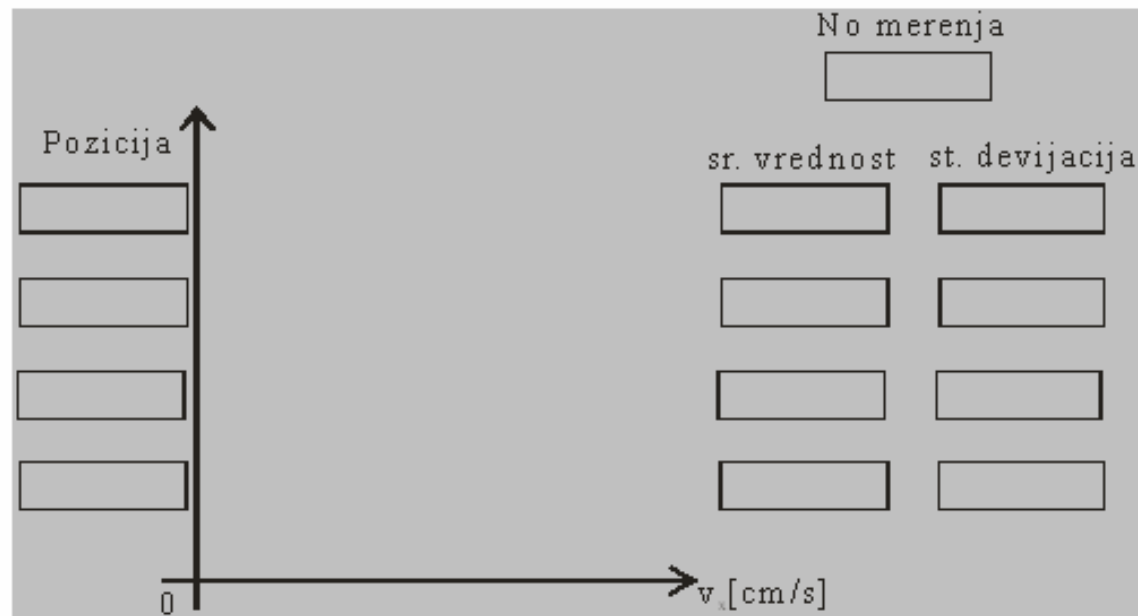
Profili brzina u vertikalama

Pozicija preseka od ivice rezervoara (Δy): _____ cm

Širina preseka: _____ cm

Dubina preseka: _____ cm

Odstojanje vertikalne od zida rezervoara (Δx): _____ cm



Slika 1: Izmerene brzine i pokazatelji statistički pokazatelji turbulencije

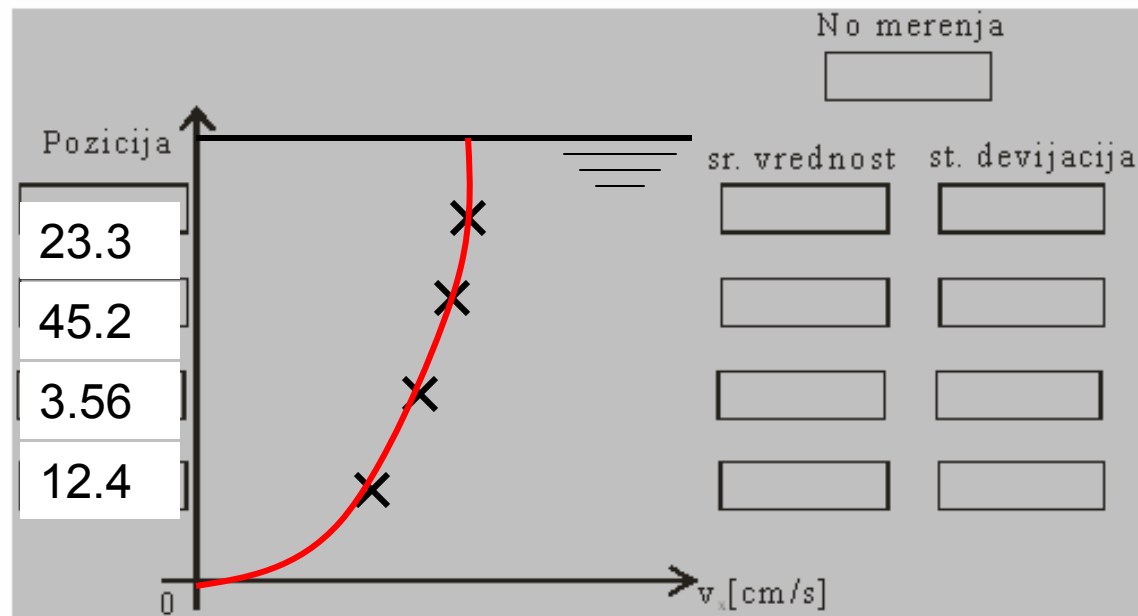
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Slika 1: Izmerene brzine i pokazatelji statistički pokazatelji turbulencije

Profili brzina u vertikalama

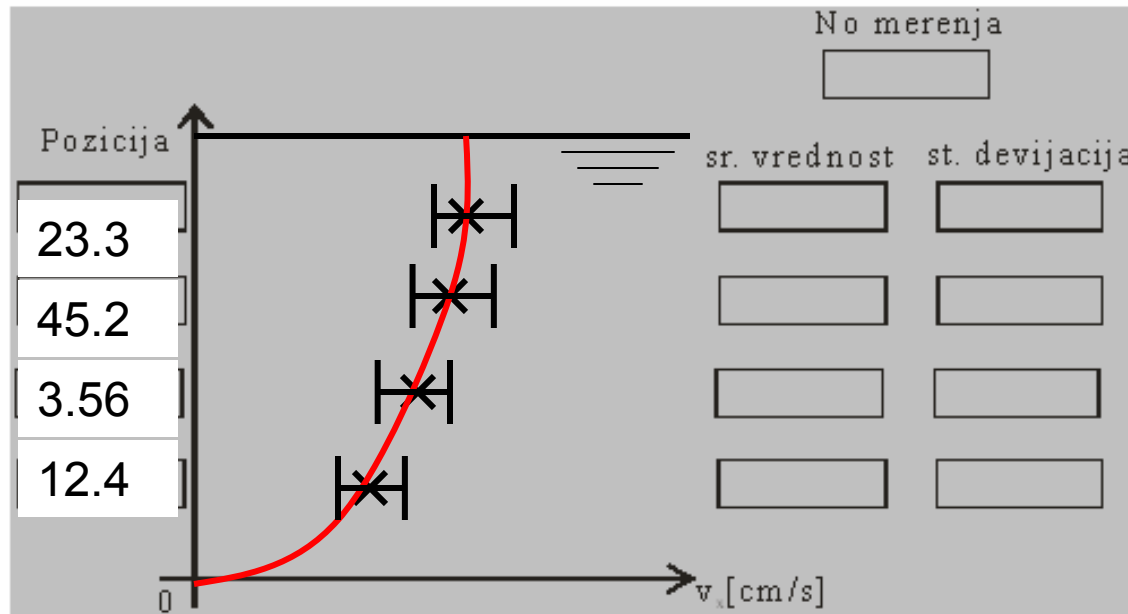
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Dubina preseka: _____ cm

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$$\delta = \frac{\sigma}{\sqrt{N}}$$



Slika 1: Izmerene brzine i pokazatelji statistički pokazatelji turbulencije

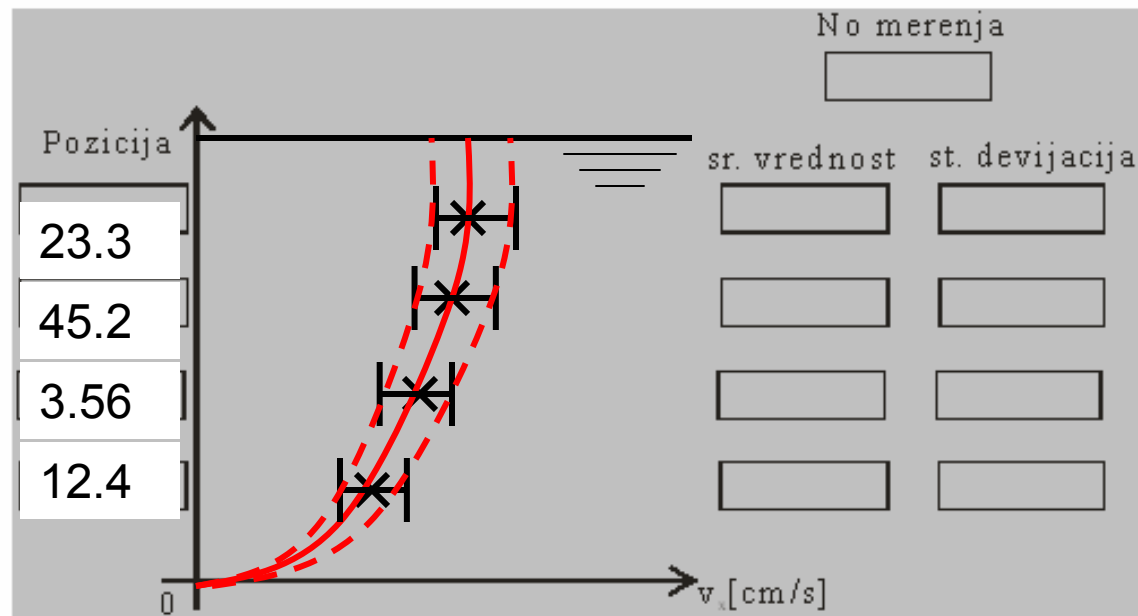
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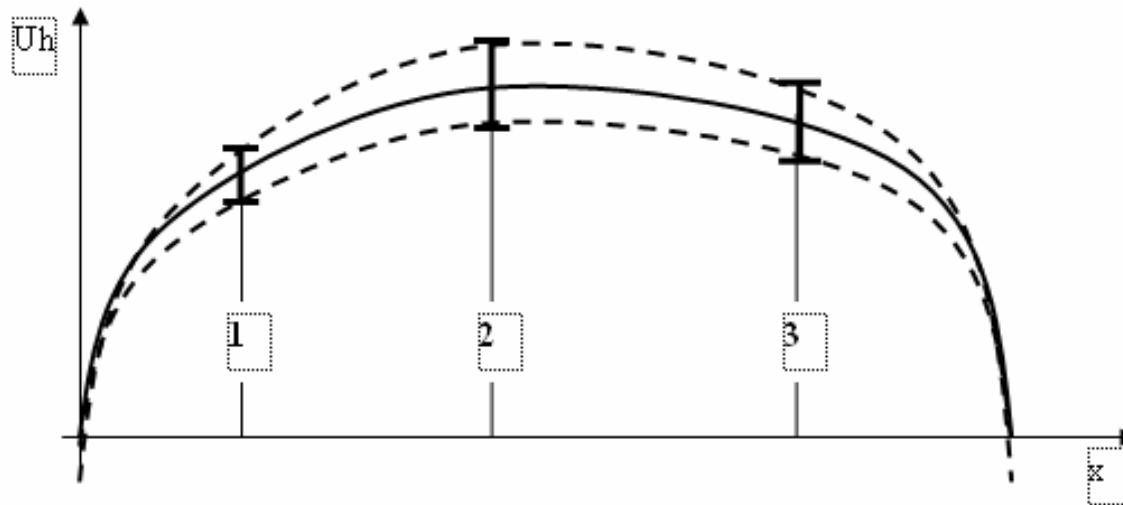


Slika 1: Izmerene brzine i pokazatelji statistički pokazatelji turbulencije

Proračun protoka

$$U = \frac{1}{h} \int_0^h u dy$$

gde je U srednja brzina u poprečnom profilu, a h dubina u vertikali. Srednje brzine izračunati na osnovu skice (slika 1), a po potrebi upotrebiti milimetarski papir. Nakon toga nacrtati dijagram $f(x)=Uh$.



Slika 2: Primer dijagrama $f(x)=Uh$

Protok izračunati kao površinu ispod dijagrama:

$$Q = \text{_____} \pm \text{_____} \text{ L/s}$$