

UNIVERZITET U BEOGRADU
GRAĐEVINSKI FAKULTET

MEHANIKA FLUIDA

SEMINARSKI RAD

MODELOVANJE RIBLJE STAZE U PROGRAMU iRIC 2.2

Beograd, jun 2014.godine

NIKOLIĆ JELENA, dipl.ing.arh

UVOD

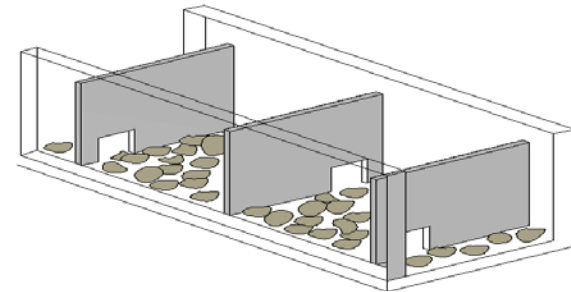
- Riblje staze:
konstrukcije kojima se olakšava primarno uzvodna, ali i nizvodna migracija ribljih vrsta u rijekama
- Mogu biti izvedene kao:
betonske konstrukcije u obliku kanala s pripadajućim preprekama
kanali koji imitiraju prirodno stanje vodotoka
- Postoji veliki broj različitih tipova ribljih staza koje se primarno razlikuju po postavljenim pregradama
- Osnovna podjela na:
tehničke riblje staze
prirodne riblje staze

UVOD

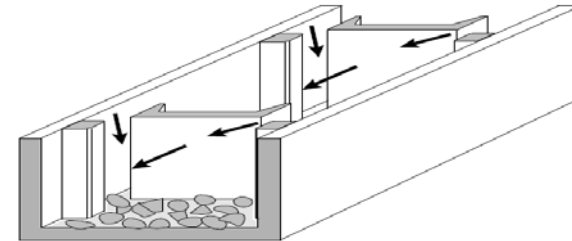
- tehničke riblje staze:
betonske konstrukcije koje potrebne uslove tečenja ostvaruju stvaranjem umjetno povećan hrapavosti i pregradama s različitim otvorima

- Najzastupljenije su:

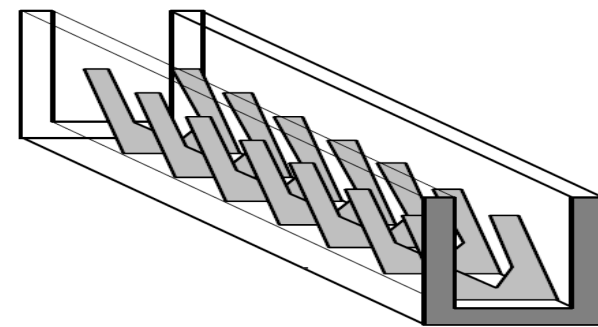
- Staze s bazenima



- Staze s vertikalnim prorezima



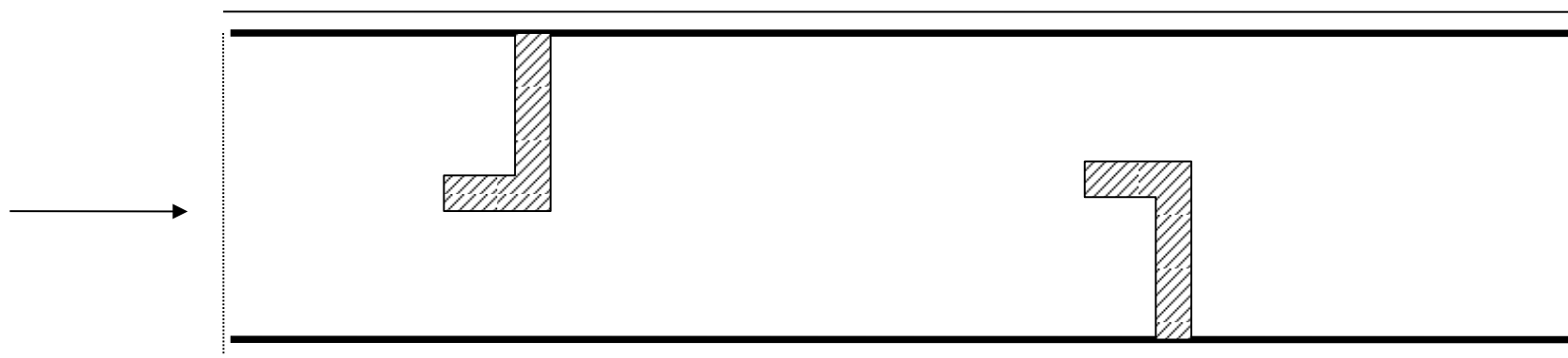
- Denilove staze



ZADATAK

•ZADATAK:

- Modelovati tip tehničke riblje staze sa preprekama



ZADATAK

- Programski paket:
 - IRIC NaysCUBE v.2.33

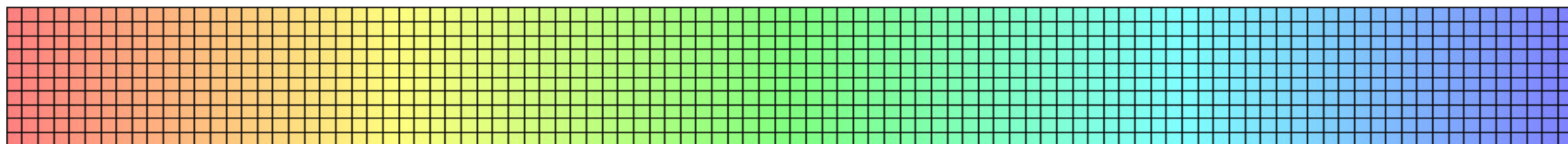
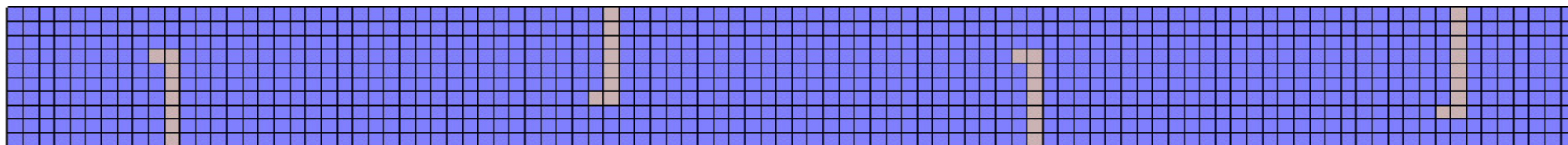
- Ulazni parametri:
 - Dužina staze: 10 m
 - Širina staze: 1 m
 - Protok: 2 m³/s

- Izlazni parametri:
 - 3D model
 - Promjena brzine
 - turbulencija

ZADATAK

•Geometrija riblje staze

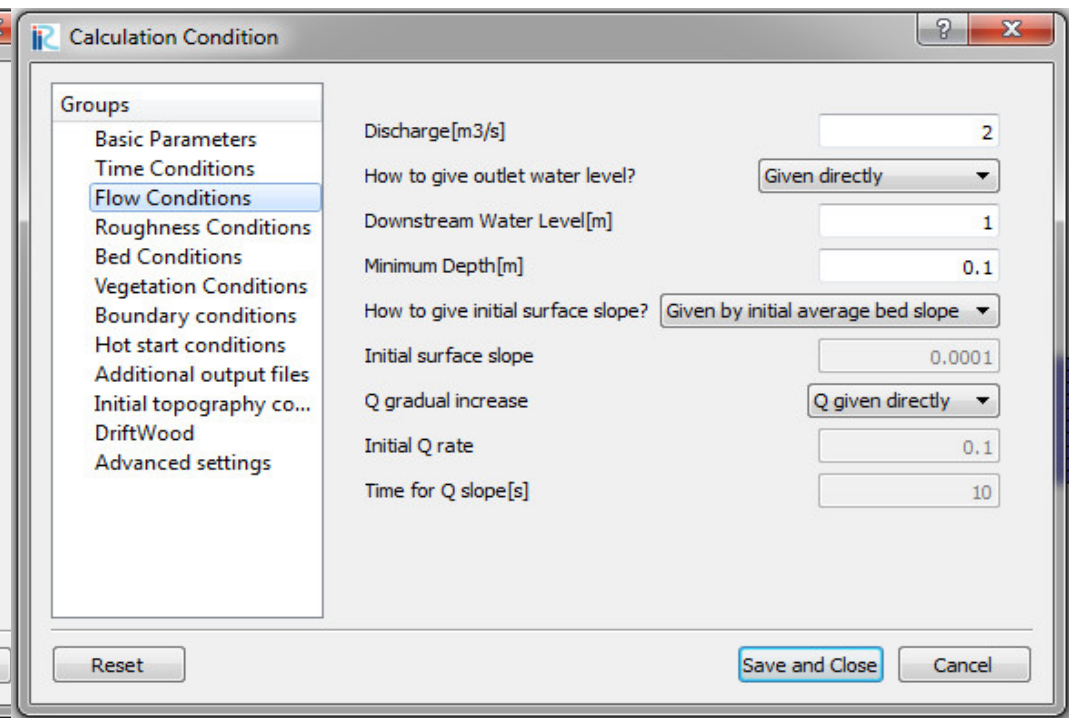
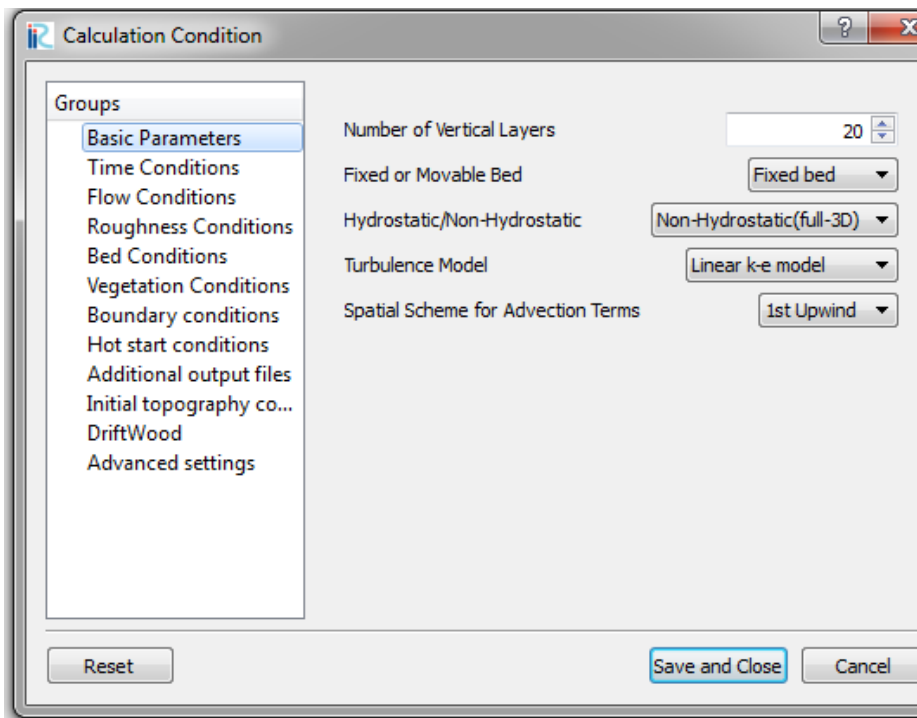
- $L = 10 \text{ m}$
- $b = 1 \text{ m}$
- ćelije $0,1\text{m}$



ZADATAK

•Uslovi za proračun

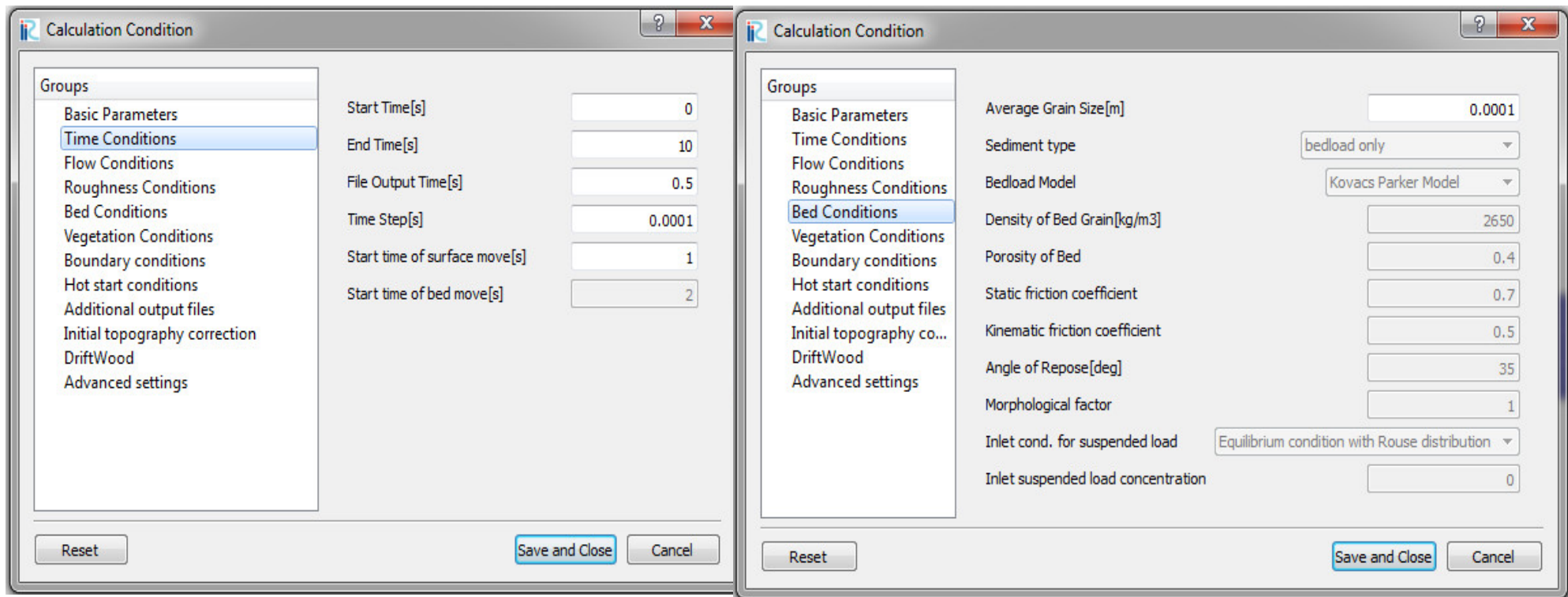
- $Q = 2 \text{ m}^3/\text{s}$
- Broj vertikalnih slojeva 20
- Vrijeme 10 s



ZADATAK

•Uslovi za proračun

- $Q = 2 \text{ m}^3/\text{s}$
- Broj vertikalnih slojeva 20
- Vrijeme 10 s

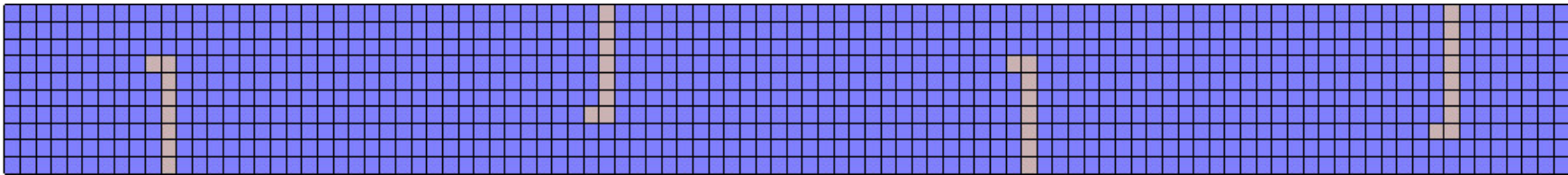


ZADATAK

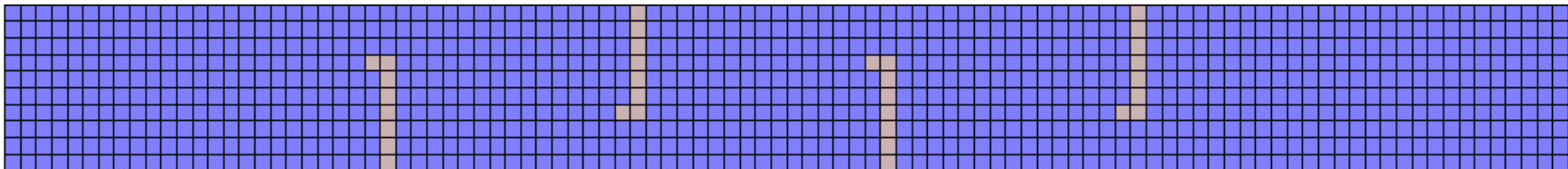
- Proračun:

- Tri varijante:

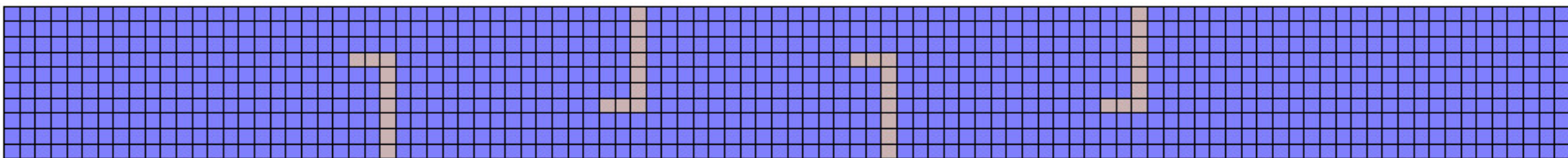
- I varijanta: (razmak između prepreka 26 ćelija, L prepreka dužine 7 ćelija, zub jedna ćelija)



- II varijanta: (razmak između prepreka 15 ćelija, L prepreka dužine 7 ćelija, zub jedna ćelija)



- III razmak 15 ćelija (razmak između prepreka 15 ćelija, prepreka dužine 7 ćelija, zub dvije ćelije)

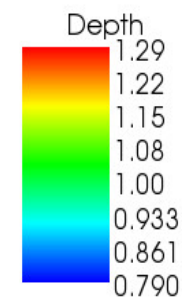
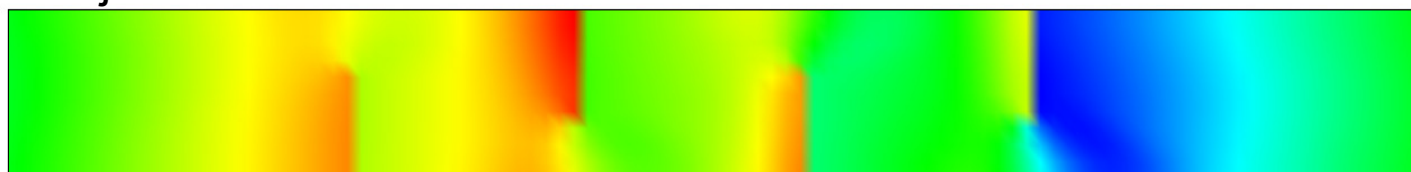


ZADATAK

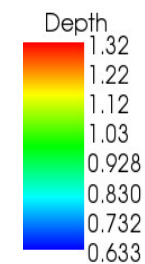
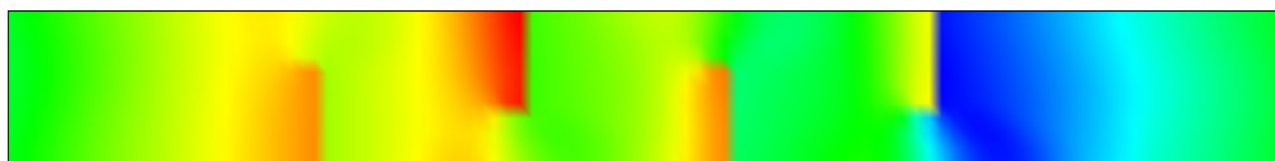
Varijanta I



Varijanta II

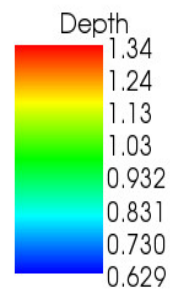


Varijanta III



•Proračun:

– Dubina



Time: 10 sec

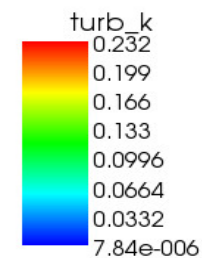
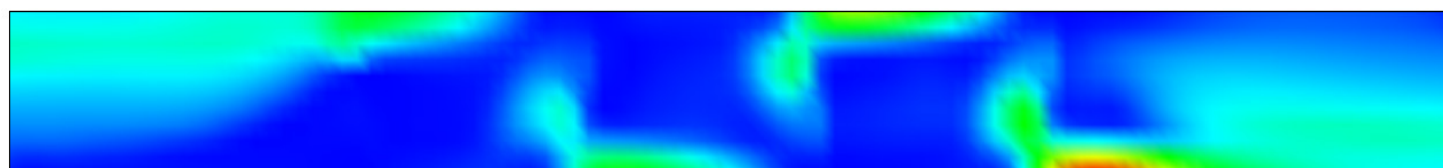
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ZADATAK

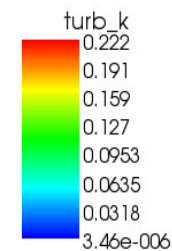
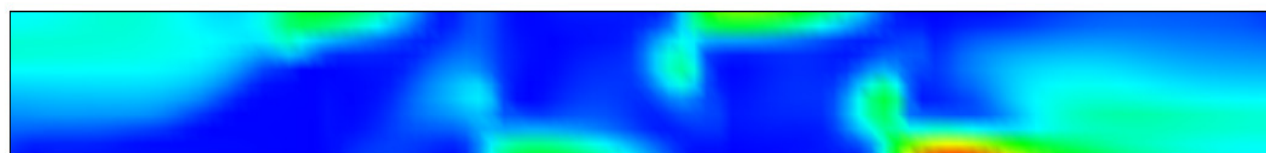
Varijanta I



Varijanta II

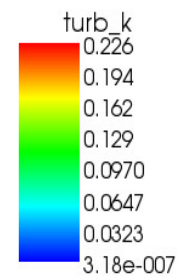


Varijanta III



•Proračun:

– TurbK

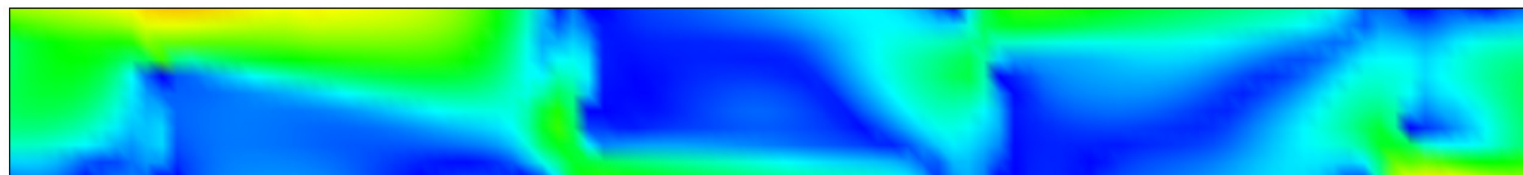


Time: 10 sec

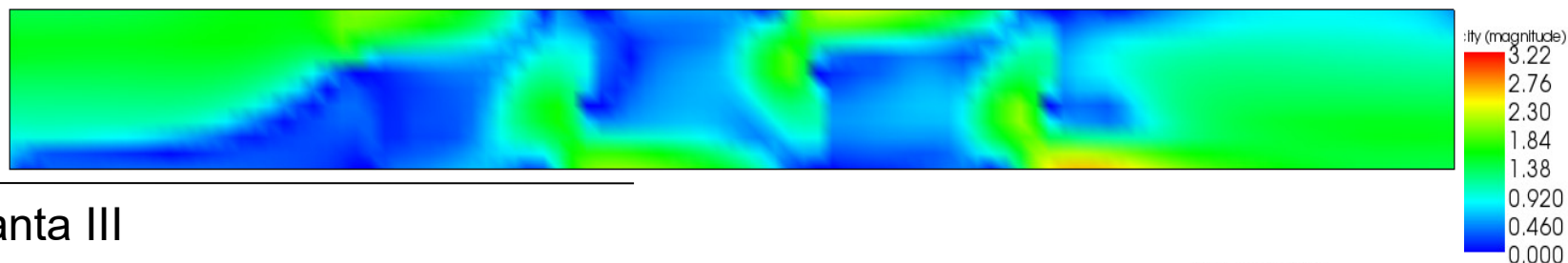
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ZADATAK

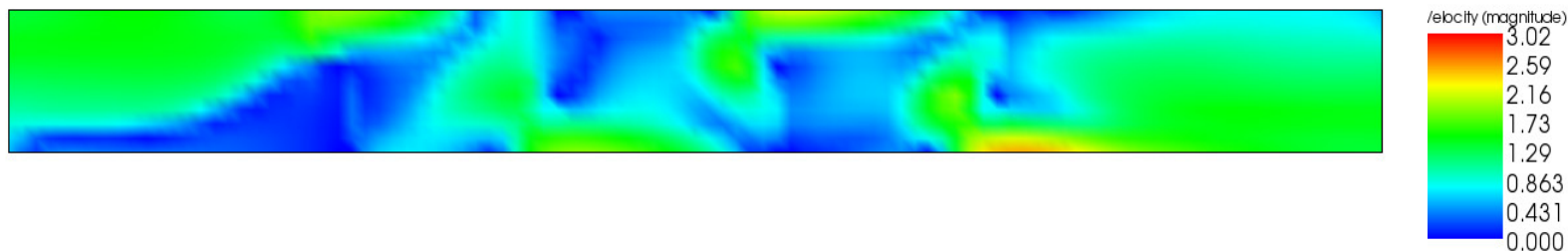
Varijanta I



Varijanta II



Varijanta III



•Proračun:

– Brzine



Time: 10 sec

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ZADATAK

• Simulacija ... KLIKNI NA IME FILE-A ZA VIDEO (vratiti se pomoću Back u browseru)

Varijanta I:

TurbK.{] |

Velocity.m] | ~~WWW~~^] c@] |

GridShape_TurbK_Hmah.m] |

VAZNO: Ignorirati zvuk!!!

Varijanta II:

Turb.m] |

Velocity.m] | ~~WWW~~^] c@] |

Varijanta III:

TurbK.m] |

Velocity.mp4 Depth.mp4

ZADATAK

ZAKLJUČAK:

- U prvoj varijanti turbulencija je najveća kod prve prepreke
- Sa povećanjem razmaka između prepreka, turbulencija je najveća kod zadnje prepreke
- U drugoj i trećoj varijanti nema značajnijih razlika
- Program:
 - Proračun dugo traje
 - Nemogućnost promjene geometrije