

Građevinski fakultet Univerzitet u Beogradu
Katedra za hidrotehniku i vodno ekološko


MEHANIKA FLUIDA – CFD
SEMINARSKI RAD

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Student:
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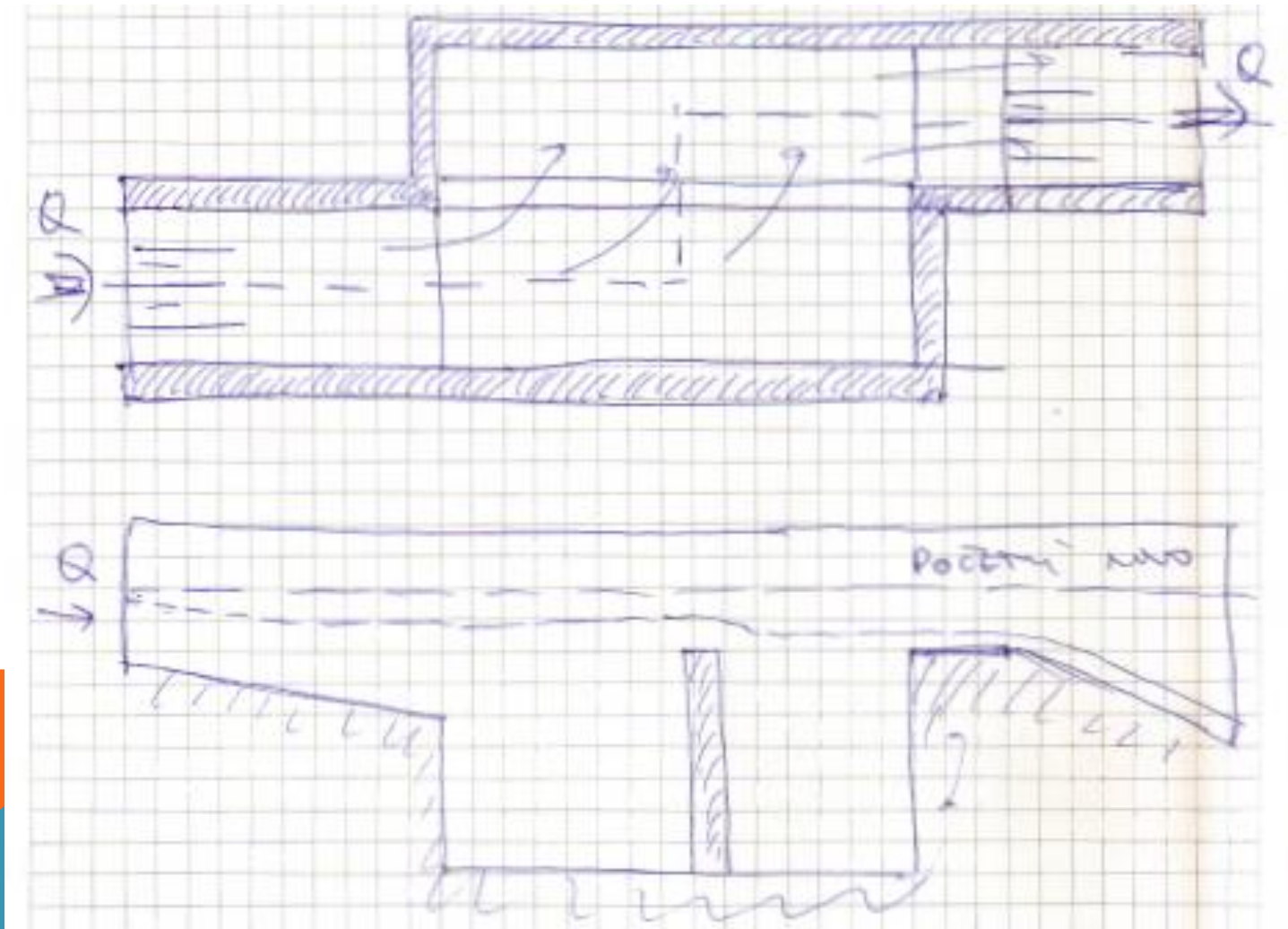
Beograd, maj 2017

SADRŽAJ

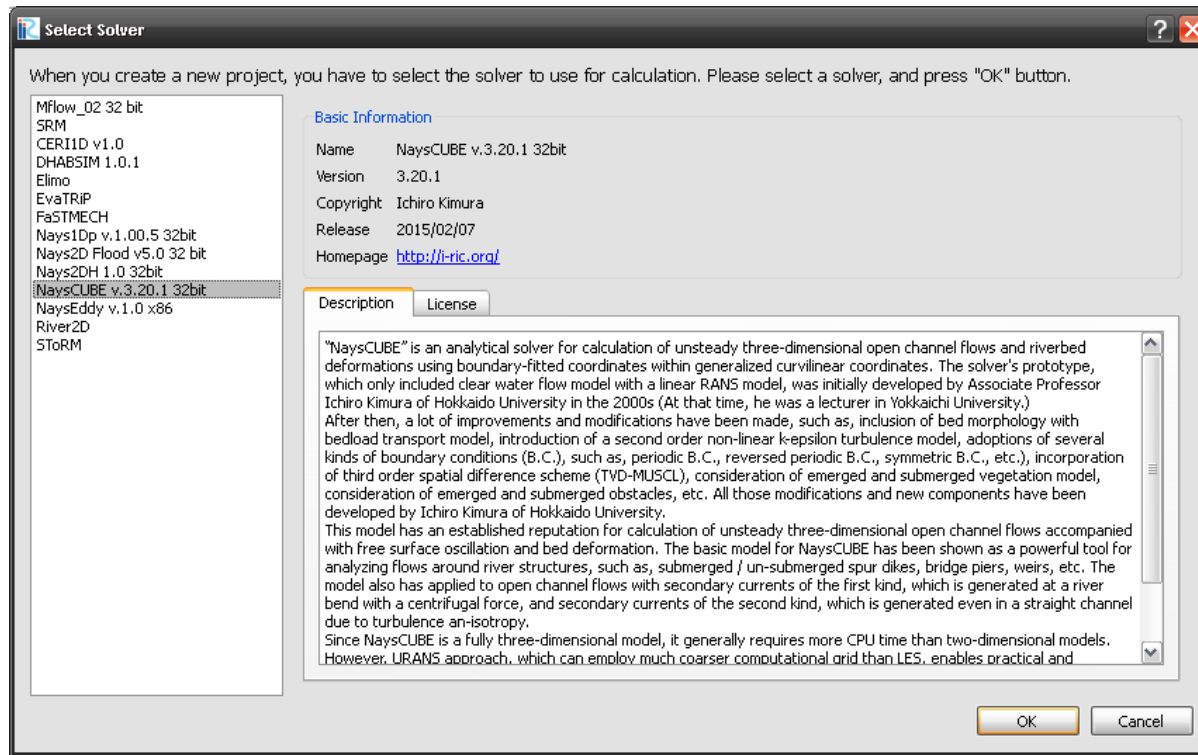
- Opis i cilj zadatka
 - Metodologija Kreiranje mreže
 - Postavljanje prepreka u tok
 - Zadavanje ulaznih podataka kao uzvodnog i nizvodnog graničnog uslova
 - Rezultati
 - Zaključak
- 

OPIS ZADATKA

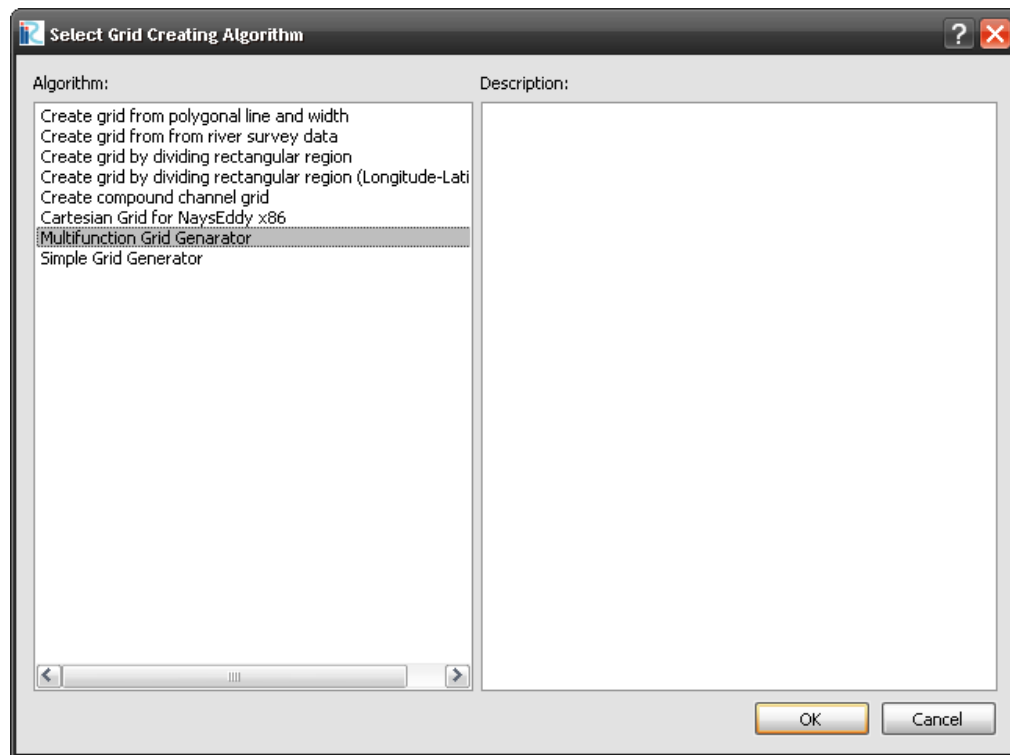
Bočni preliv potopljen sa nizvodne strane



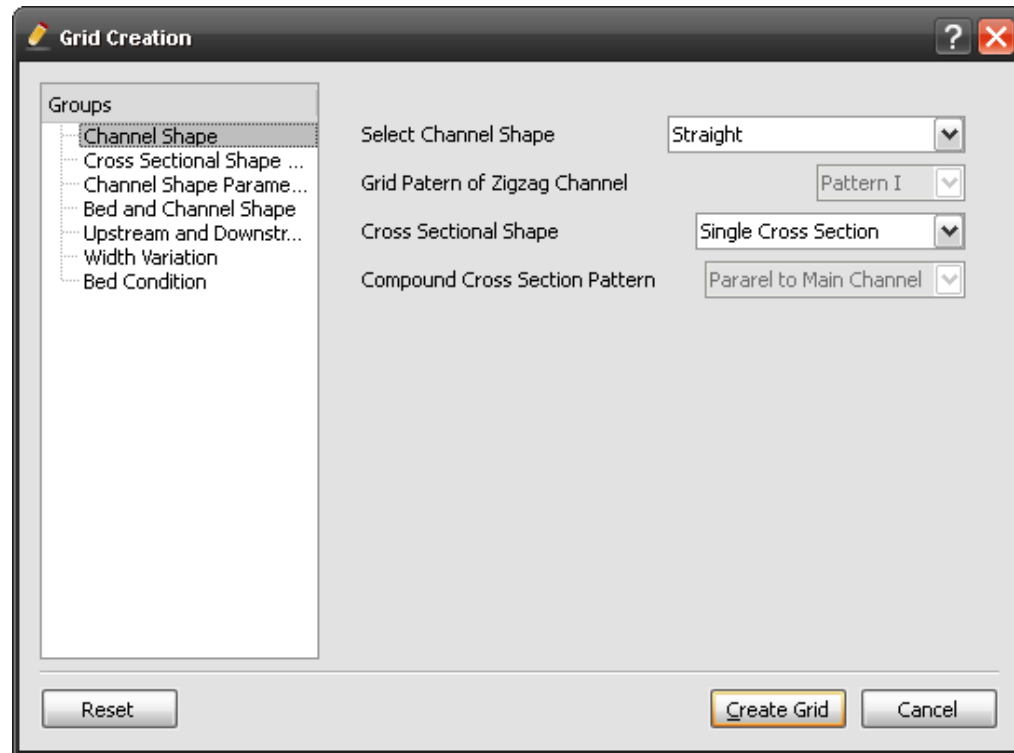
KREIRANJE MREŽE



KREIRANJE MREŽE



KREIRANJE MREŽE



KREIRANJE MREŽE

Grid Creation

Groups

- Channel Shape
- Cross Sectional Shape ...
- Channel Shape Parame...
- Bed and Channel Shape
- Upstream and Downstr...
- Width Variation
- Bed Condition

Single Cross Section

Width(m)

Number of Grid in Lateral Direction

Compound Channel

Numbers of Grids

Left Floodplain

Low Water Channel

Right Floodplain

Low Water Channel Depth(m)

Bank Slope Ratio of Low Water Channel

Numbers of Grids in Low Water Channel Bank

Simple Compound Channel

Channel Width

Left Flood Channel Width(m)

Low Water Channel Width(m)

Right Flood Channel Width(m)

With Straight or Meandering Levees

Total Width(m)

Low Water Channel Width(m)

Left Levee Distance from Channel Center(m)

Right Levee Distance from Channel Center(m)

KREIRANJE MREŽE

Grid Creation

Groups

- Channel Shape
- Cross Sectional Shape Paramet...
- Channel Shape Parameters
- Bed and Channel Shape
- Upstream and Downstream Co...
- Width Variation
- Bed Condition

Wave Length of Meander(m)

Wave Number

Meander Angle(degree)

Number of Grids in One Wave Length

Levee Meander Parameters

Meander Angle(degree)

Meander Wave Length(m)

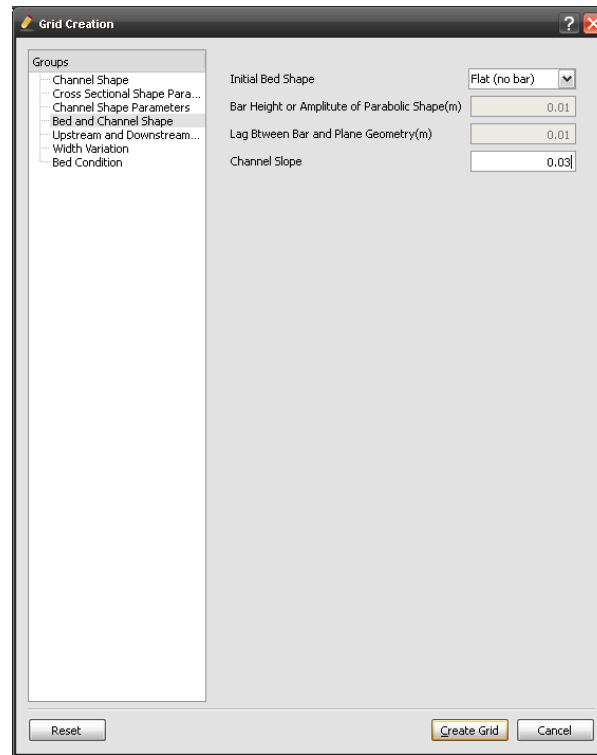
Phase Lag from LWC(m)

Kinoshita Meander Parameters

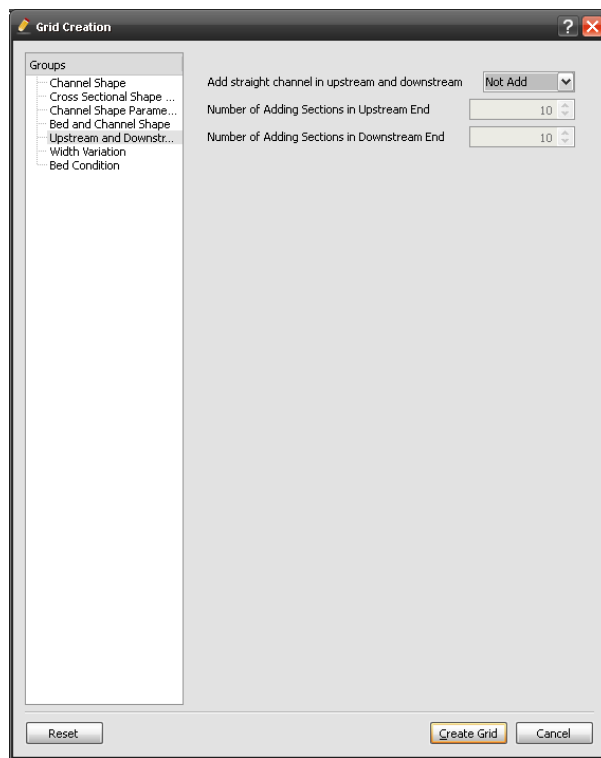
Additional Meander Angle(degree)

n1(Wave Number of the second term)

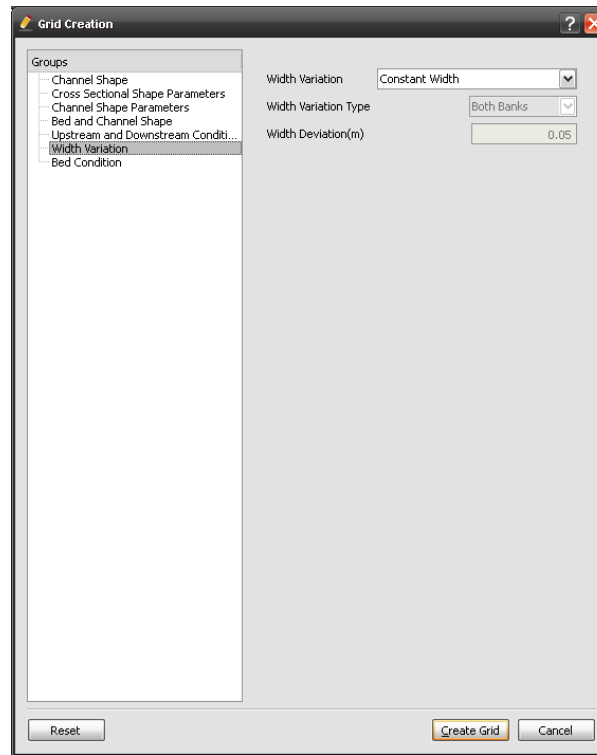
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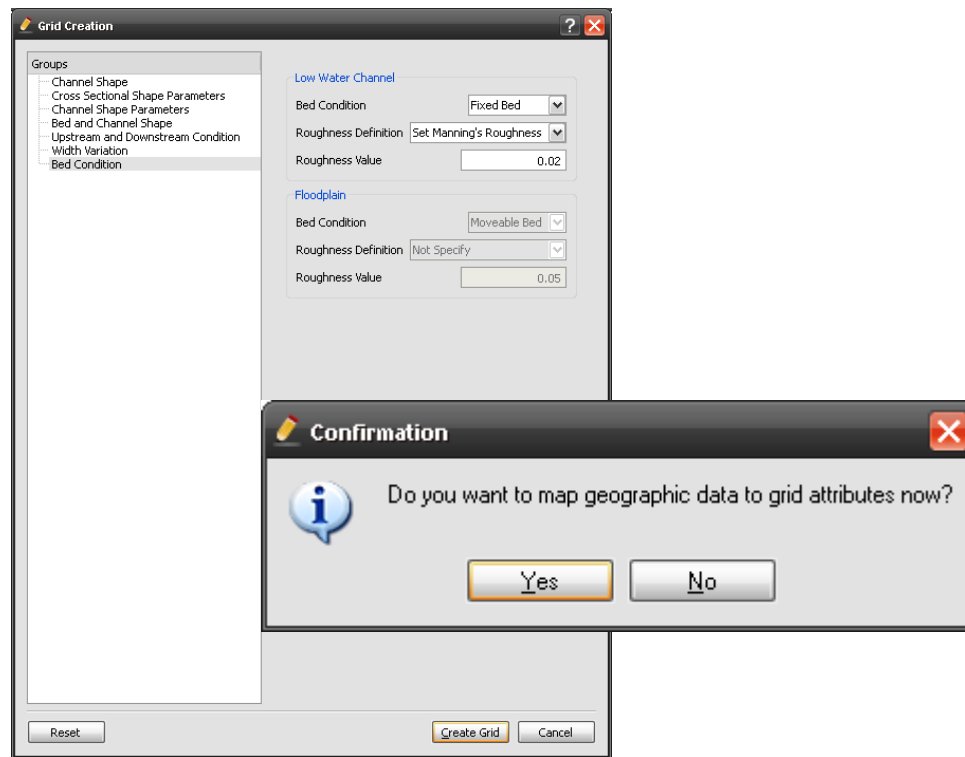
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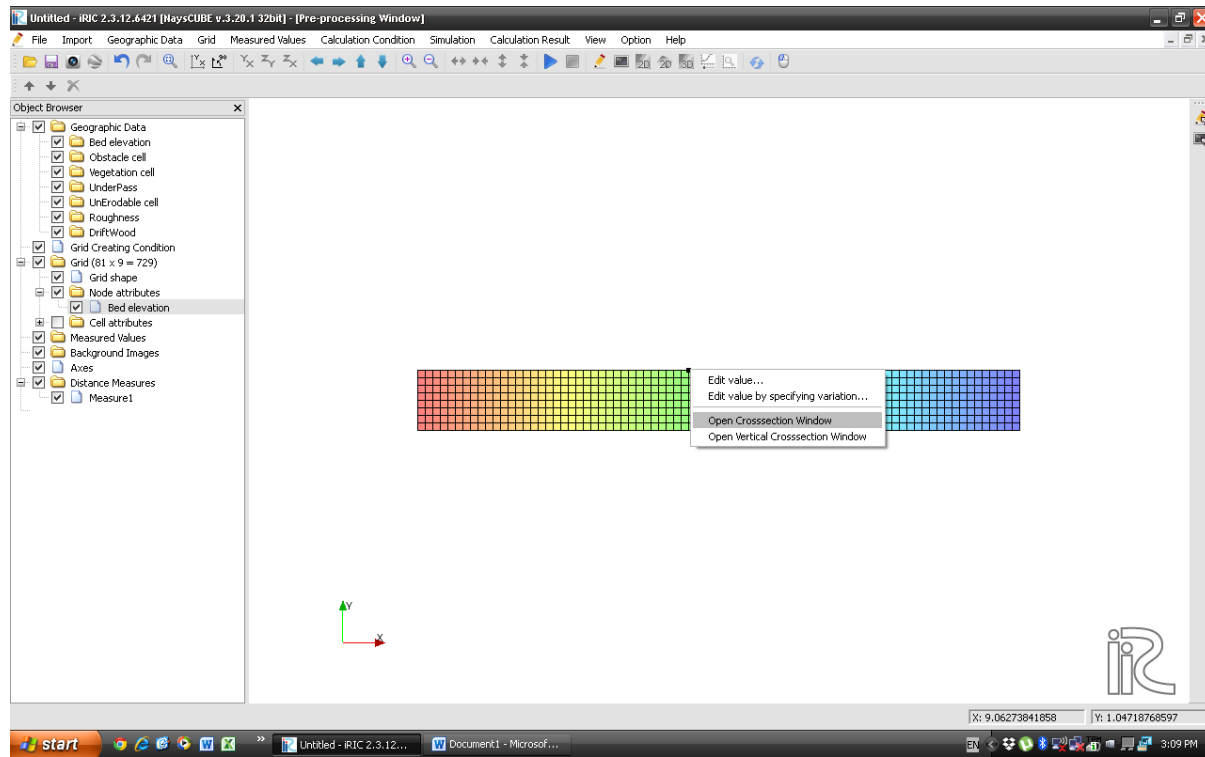
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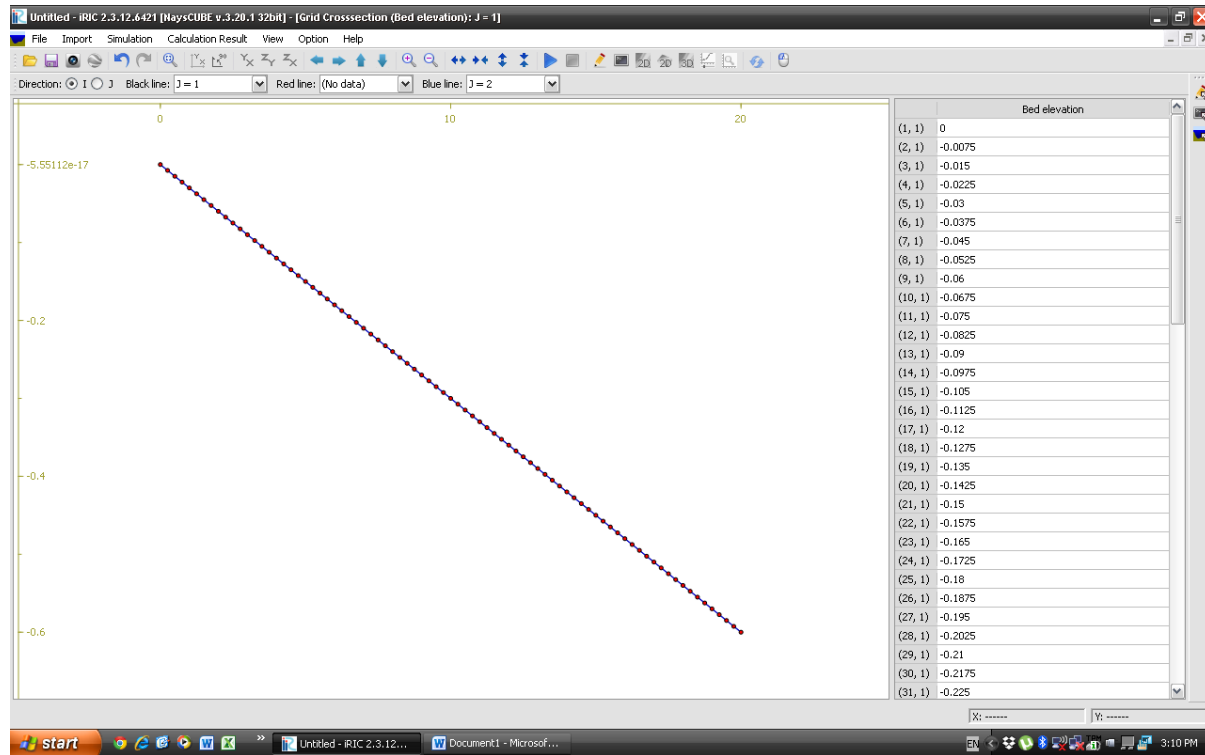
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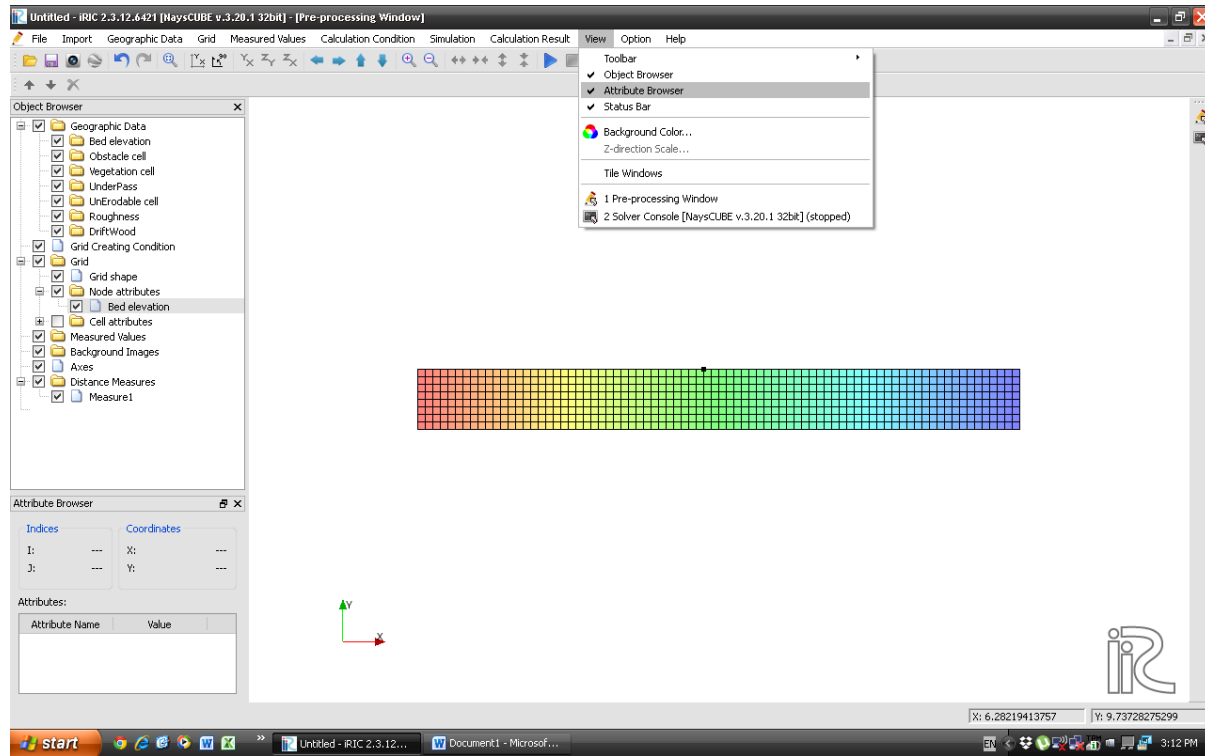
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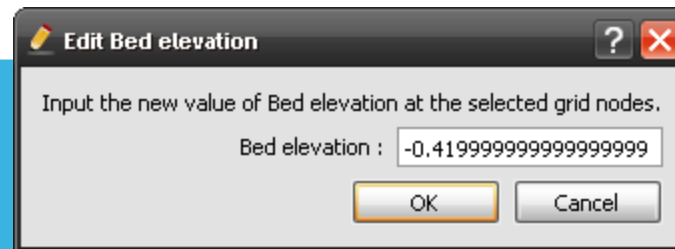
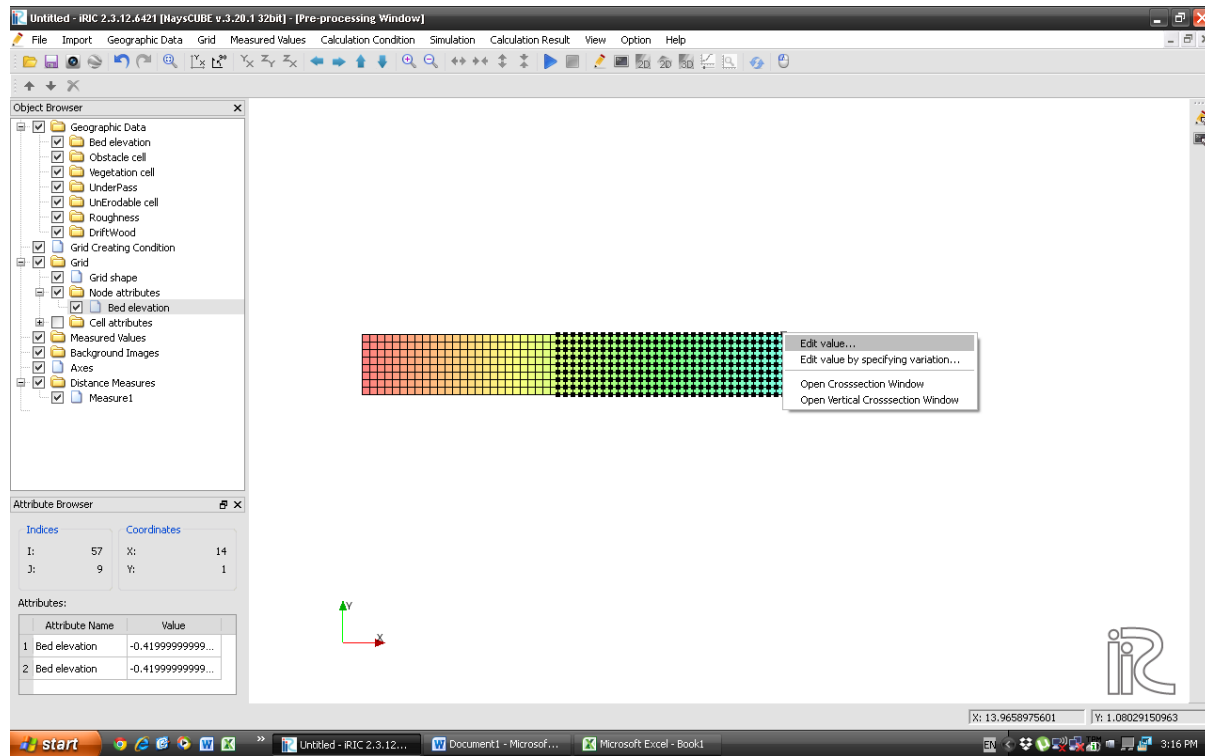
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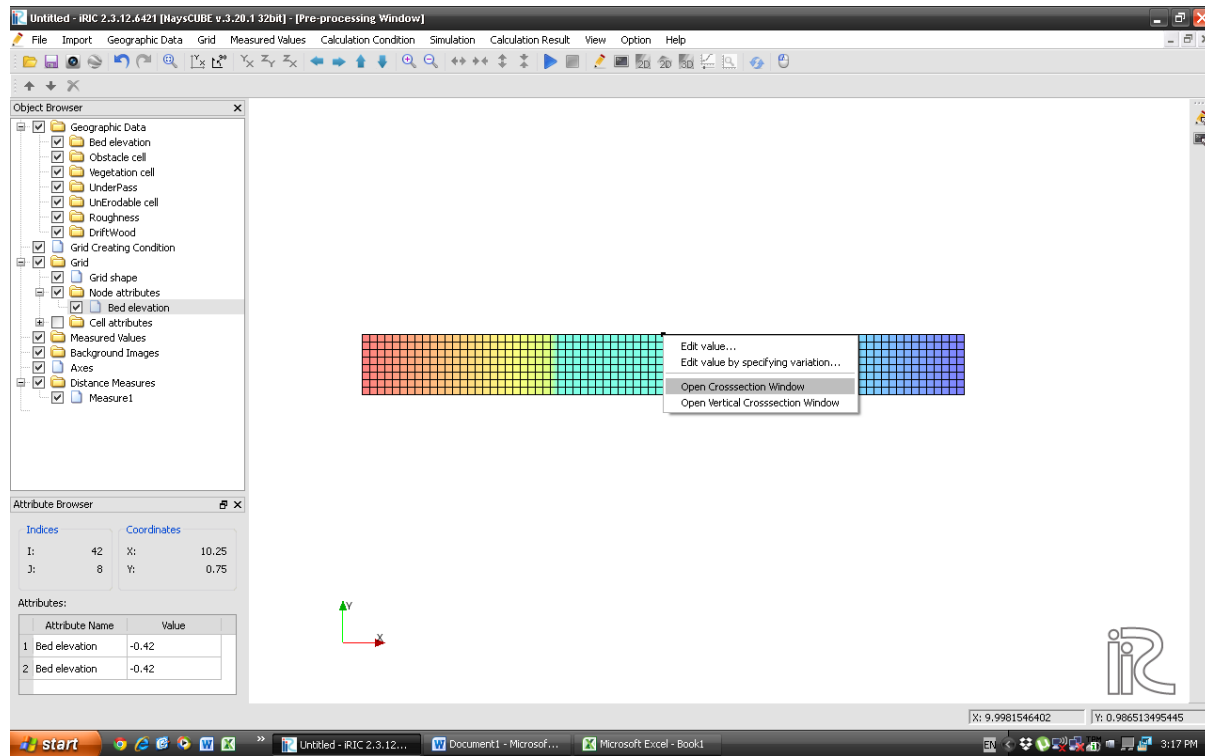
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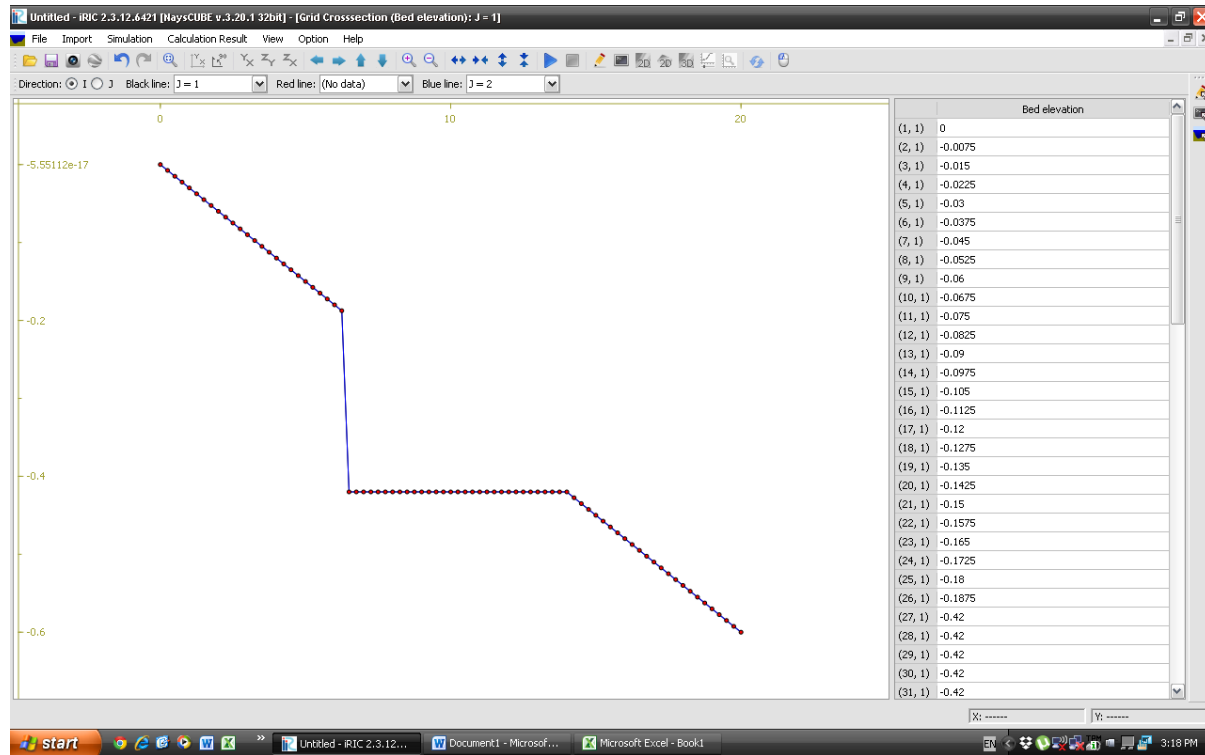
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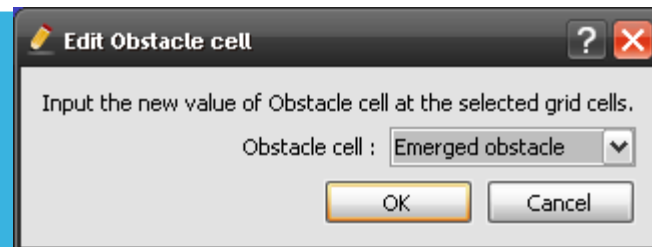
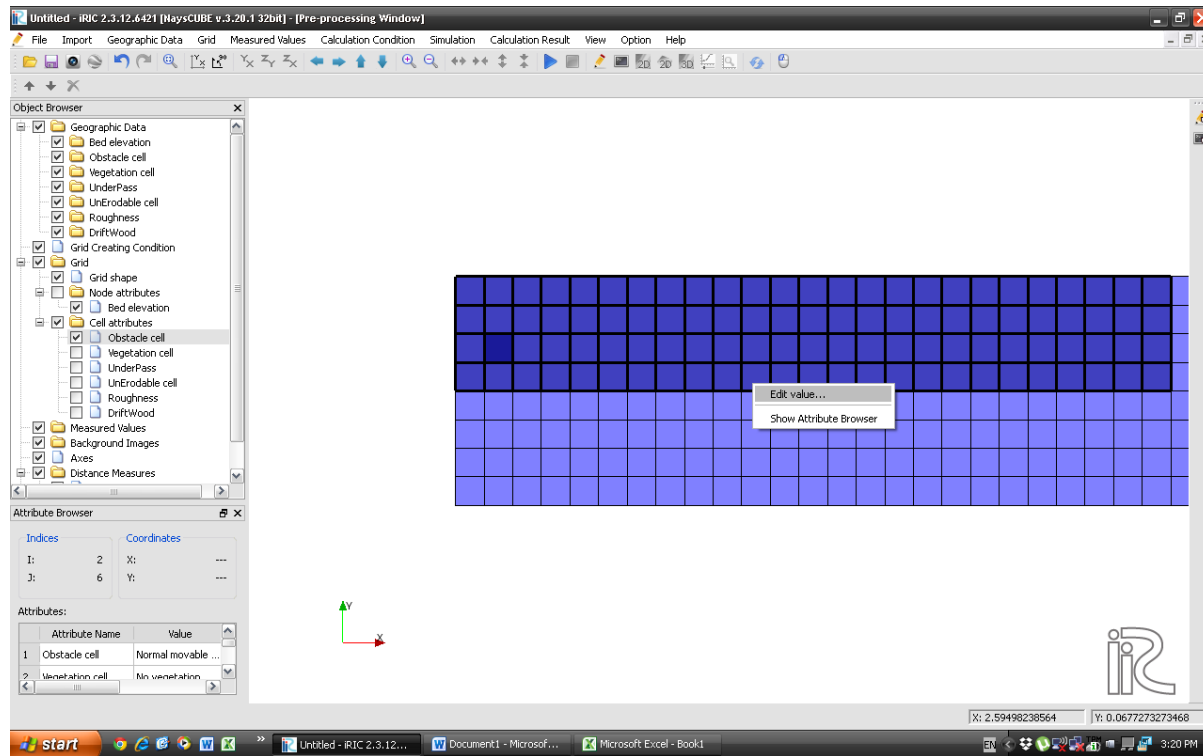
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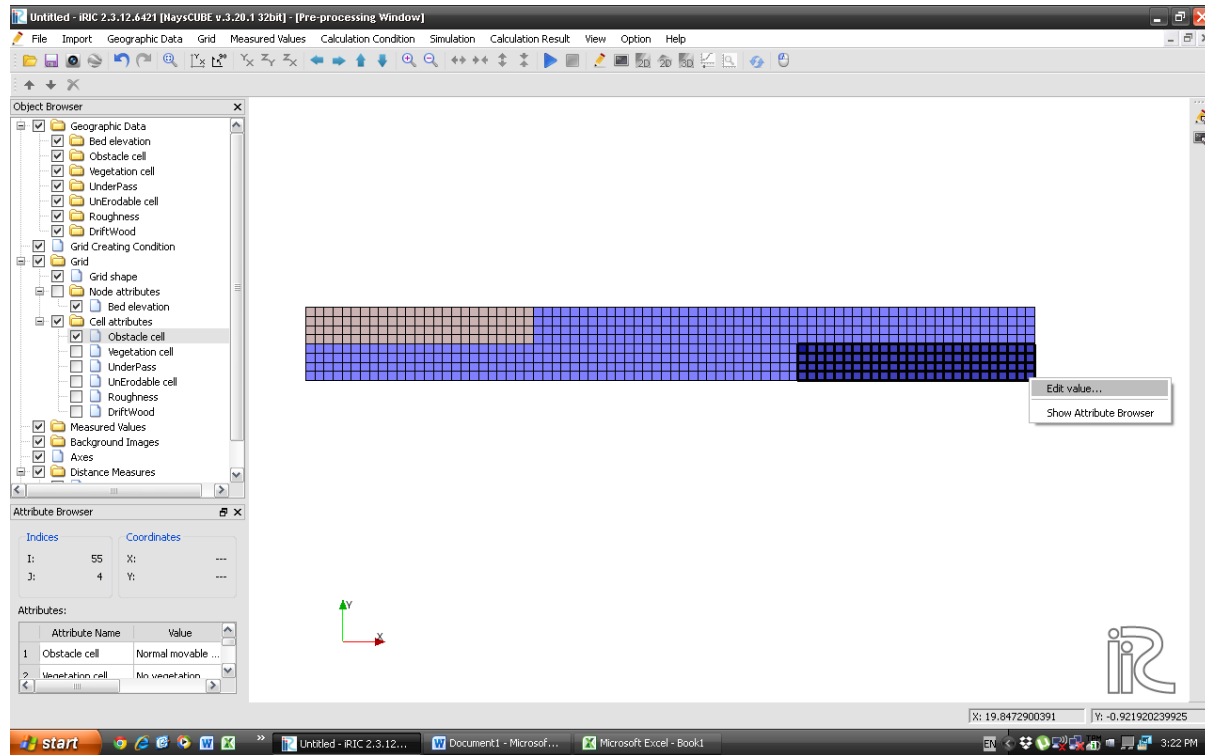
KREIRANJE MREŽE



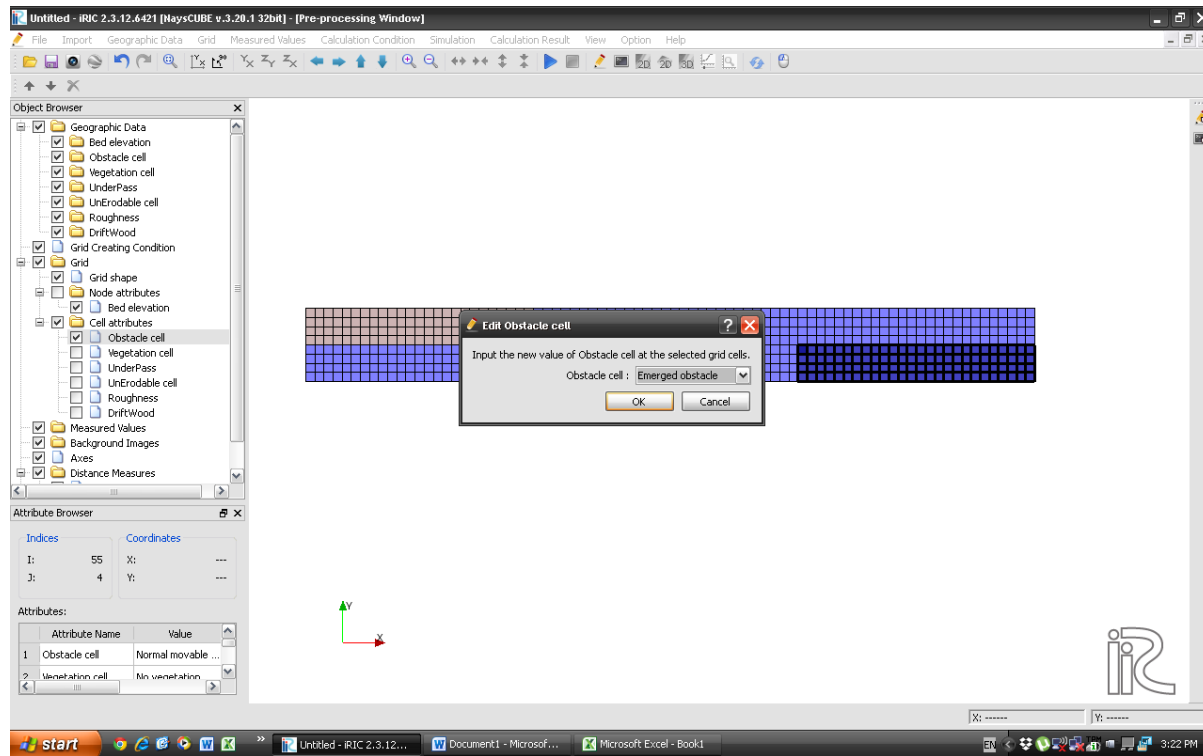
POSTAVLJANJE PREPREKA U TOK



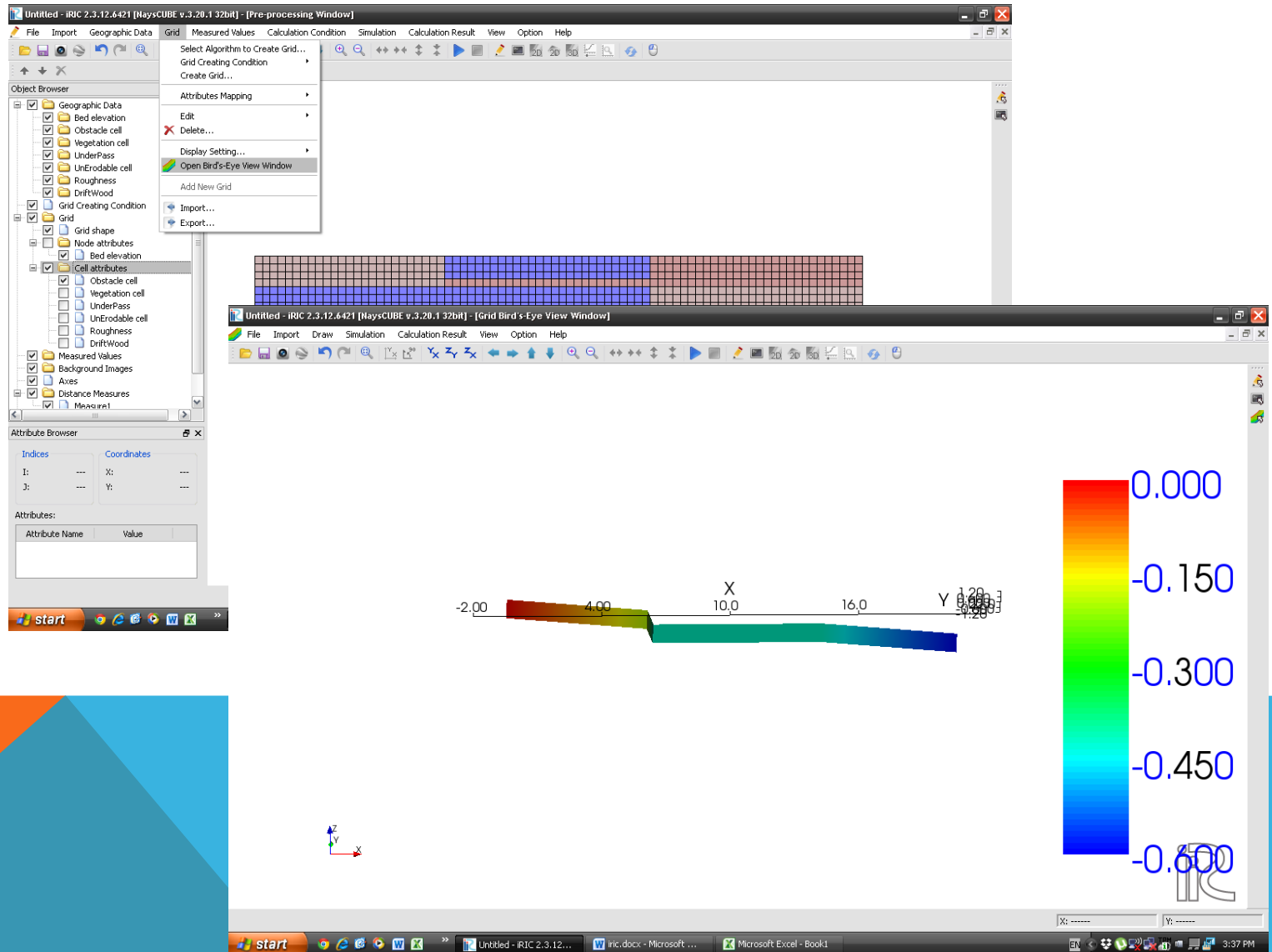
POSTAVLJANJE PREPREKA U TOK



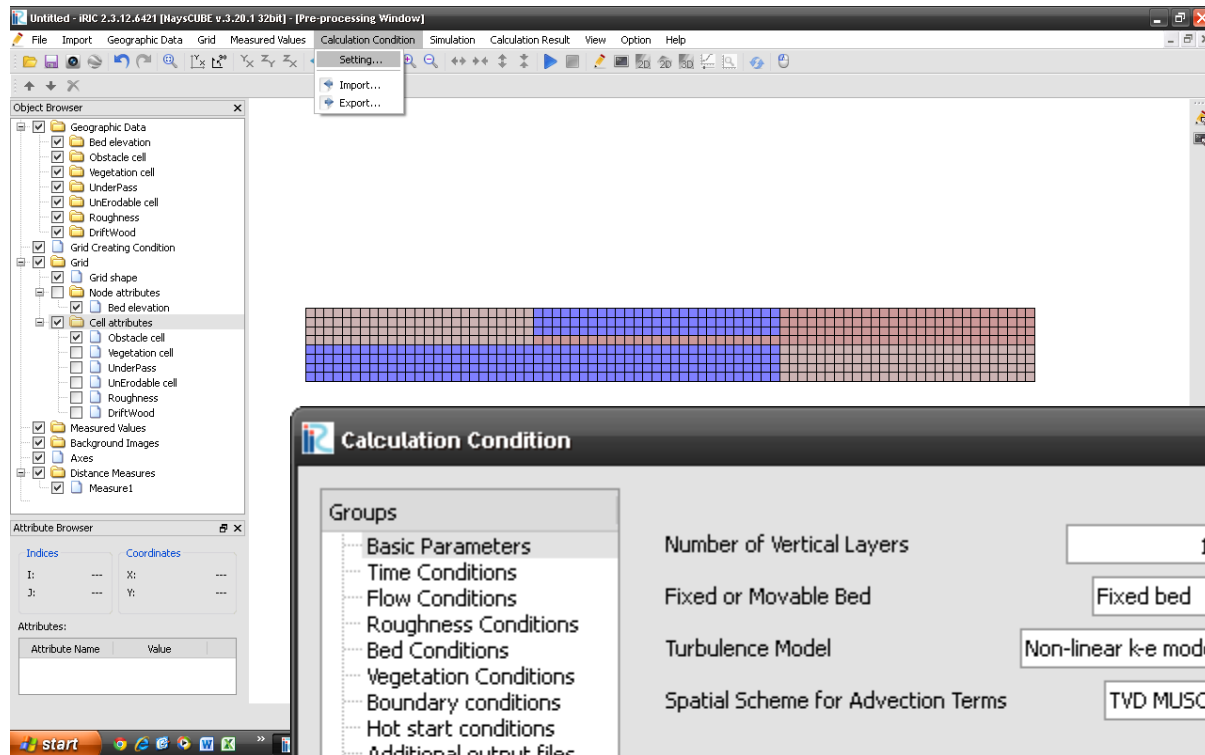
POSTAVLJANJE PREPREKA U TOK



POSTAVLJANJE PREPREKA U TOK



ZADAVANJE ULAZNIH PODATAKA



ZADAVANJE ULAZNIH PODATAKA

Calculation Condition

Groups

- Basic Parameters
- Time Conditions
- Flow Conditions
- Roughness Conditions
- Bed Conditions
- Vegetation Conditions
- Boundary conditions
- Hot start conditions
- Additional output files
- Initial topography correction
- DriftWood
- Advanced settings

Start Time[s]

End Time[s]

File Output Time[s]

Time Step[s]

Start time of surface move[s]

Start time of bed move[s]

Reset

Q1=300 L/s
Q2=1000 L/s
Q3=2000 L/s

Calculation Condition

Groups

- Basic Parameters
- Time Conditions
- Flow Conditions
- Roughness Conditions
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Discharge[m³/s]

How to give outlet water level?

Downstream Water Level[m]

Minimum Depth[m]

How to give initial surface slope?

Initial surface slope

Q gradual increase

Initial Q rate

Time for Q slope[s]

Reset

ZADAVANJE ULAZNIH PODATAKA

Calculation Condition [?] [X]

Groups

- Basic Parameters
- Time Conditions
- Flow Conditions
- Roughness Conditions**
- Bed Conditions
- Vegetation Conditions
- Boundary conditions
- Hot start conditions
- Additional output files
- Initial topography correction
- DriftWood
- Advanced settings

How to evaluate u^* at BED?

Manning n for zone A

Manning n for zone B

Manning n for zone C

Manning n for zone D

Manning n for zone E

How to calculate u^* at WALL?

Manning n for WALL

Manning n for obstacle

Calculation Condition [?] [X]

Groups

- Basic Parameters
- Time Conditions
- Flow Conditions
- Roughness Conditions
- Bed Conditions
- Vegetation Conditions
- Boundary conditions**
- Hot start conditions
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Side wall friction

Periodic/Non-periodic B.C. for X

Normal/Mirror Periodic in X ?

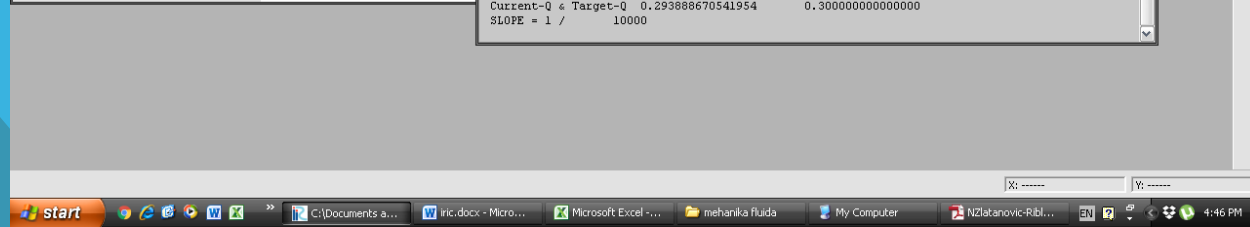
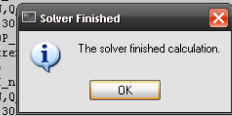
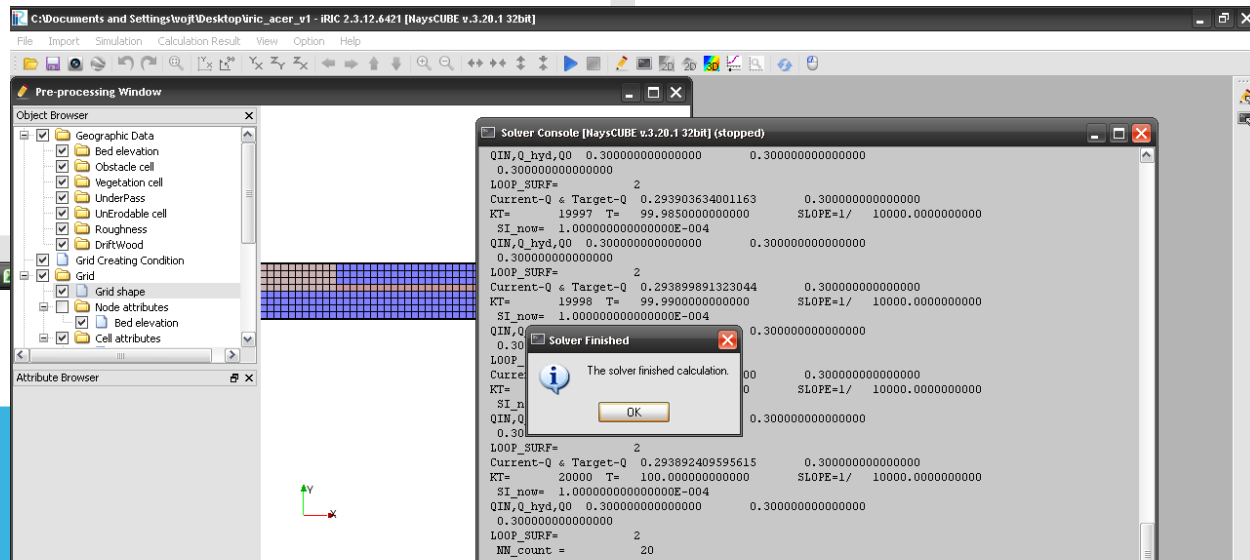
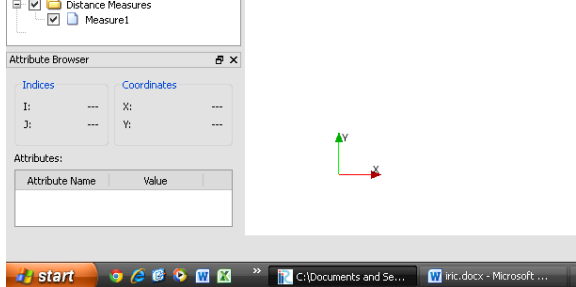
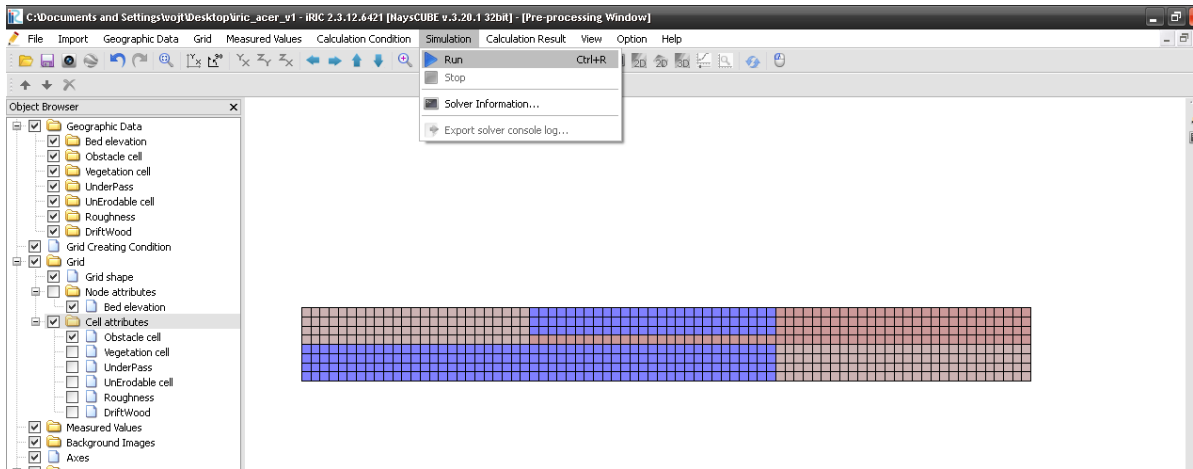
Method to adjust Q under periodic B.C.

Periodic/Non-periodic B.C. for Y

Symmetric B.C.at Right bank?

Symmetric B.C.at Left bank?

ZADAVANJE ULAZNIH PODATAKA



ZADAVANJE ULAZNIH PODATAKA

Mali problemi
Možda zbog mreže

```
0.3000000000000000
LOOP_SURF= 4
Current-Q & Target-Q 0.332767459706071 0.3000000000000000
KT= 25459 T= 50.91800000000000 SLOPE=1/ 10000.000000000000
SI_now= 1.0000000000000000E-004
QIN,Q_hyd,Q0 0.3000000000000000 0.3000000000000000
0.3000000000000000
LOOP_SURF= 4
Current-Q & Target-Q 0.332767459706071 0.3000000000000000
KT= 25460 T= 50.92000000000000 SLOPE=1/ 10000.000000000000
SI_now= 1.0000000000000000E-004
QIN,Q_hyd,Q0 0.3000000000000000 0.3000000000000000
0.3000000000000000
LOOP_SURF= 6
MN_count = 50
Current-Q & Target-Q 0.412435447146201 0.3000000000000000
KT= 25461 T= 50.92200000000000 SLOPE=1/ 10000.000000000000
SI_now= 1.0000000000000000E-004
QIN,Q_hyd,Q0 0.3000000000000000 0.3000000000000000
0.3000000000000000
LOOP_SURF= 14
Current-Q & Target-Q 6231110.18941308 0.3000000000000000
KT= 25462 T= 50.92400000000000 SLOPE=1/ 10000.000000000000
SI_now= 1.0000000000000000E-004
QIN,Q_hyd,Q0 0.3000000000000000 0.3000000000000000
0.3000000000000000
LOOP_SURF= 101
Q takes NaN value! Check dt and other conditions !
We suspend computation !!
Fortran Pause - Enter command<CR> or <CFO> to continue.
```

X: -2.80963182449 Y: -0.197702467442

ZADAVANJE ULAZNIH PODATAKA

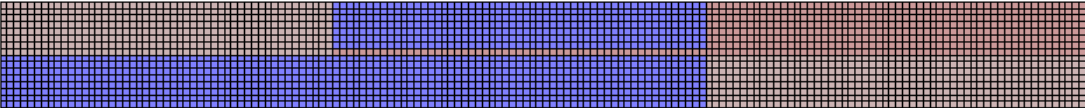
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File Import Geographic Data Grid Measured Values Calculation Condition Simulation Calculation Result View Option Help

Object Browser

- Geographic Data
 - Bed elevation
 - Obstacle cell
 - Vegetation cell
 - UnderPass
 - UnErodable cell
 - Roughness
 - DriftWood
- Grid Creating Condition
 - Grid (161 x 17 = 2737)
 - Grid shape
 - Node attributes
 - Bed elevation
 - Cell attributes
 - Obstacle cell
 - Vegetation cell
 - UnderPass
 - UnErodable cell
 - Roughness
 - DriftWood
- Measured Values
- Background Images
- Axes
- Distance Measures
 - Measure1

2x GUŠĆA MREŽA



Attribute Browser


Indices Coordinates

I: --- X: ---
J: --- Y: ---

Attributes:

Attribute Name	Value
----------------	-------

X: 1.1617680788 Y: 3.73571610451



start C:\Documents and Se... C:\Documents and Se... iric.docx - Microsoft ... Microsoft Excel - Book1 12:40 AM

ZADAVANJE ULAZNIH PODATAKA

C:\Documents and Settings\wojt\Desktop\iric_acer_v1_2xGrid - iRIC 2.3.12.6421 [MaysCUBE v.3.20.1 32bit] - [Pre-processing Window]

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 - Measure1

Attribute Browser

Indices Coordinates

I: --- X: ---
J: --- Y: ---

Attributes:

Attribute Name	Value
----------------	-------

2x GUŠĆA MREŽA PLUS PODIGNUT PRELIV SA KOSINOM

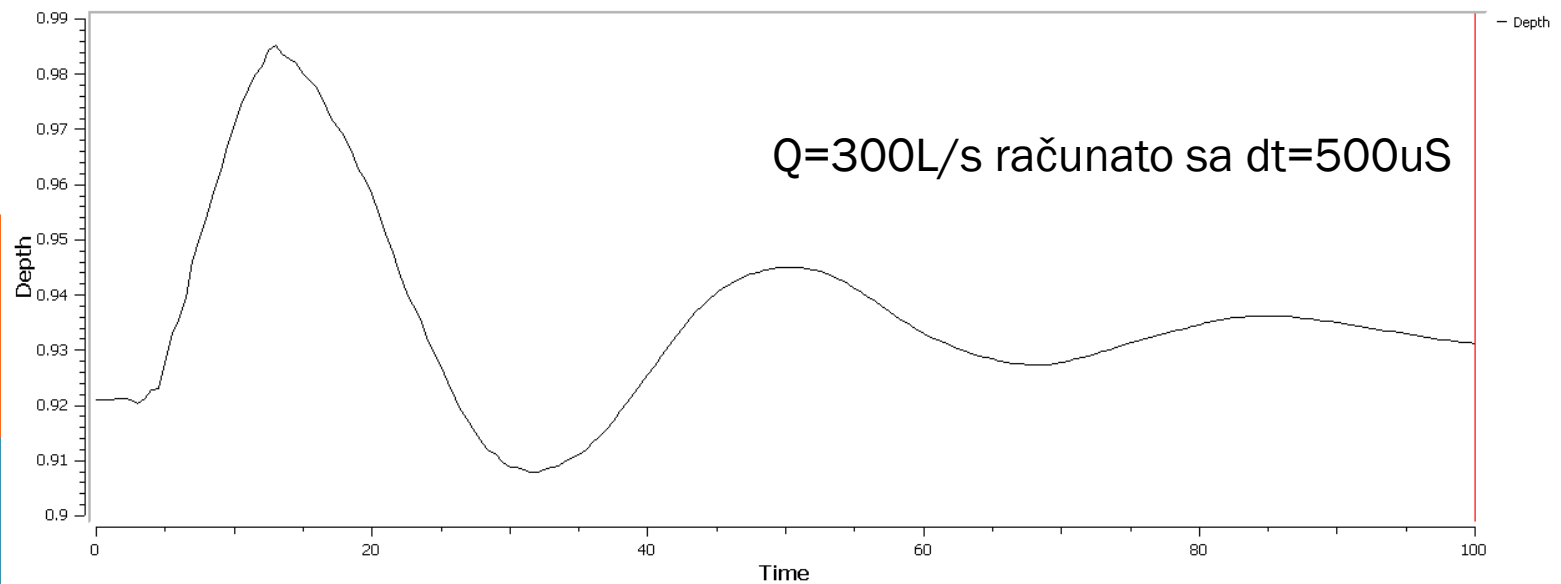
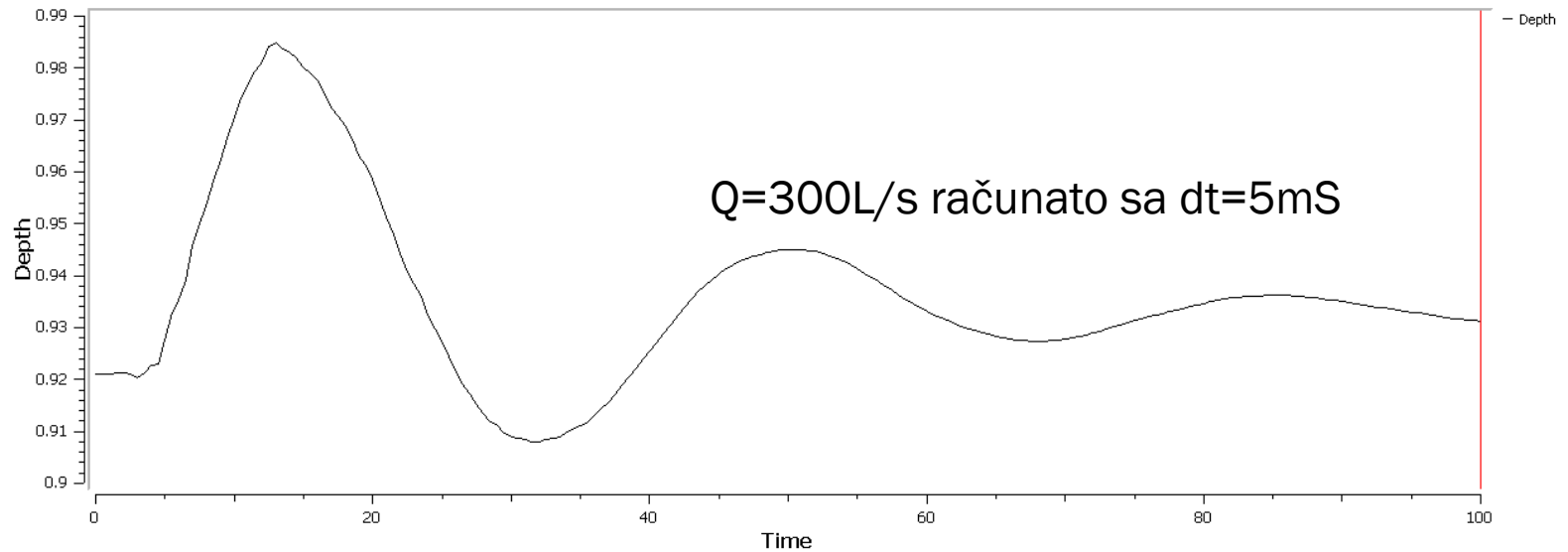
7.0 8.0 1.0 8.0

POČETNI NIVD

start C:\Documents and Se... C:\Documents and Se... iric.docx - Microsoft ... Microsoft Excel - Book1 12:40 AM

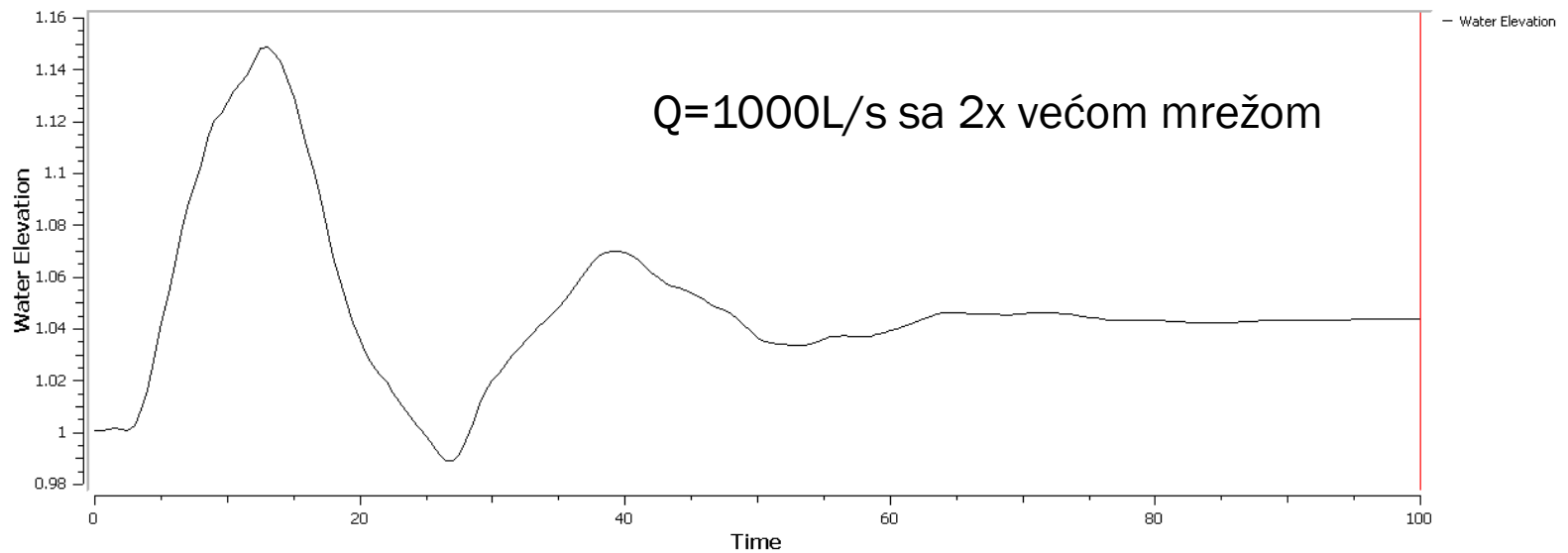
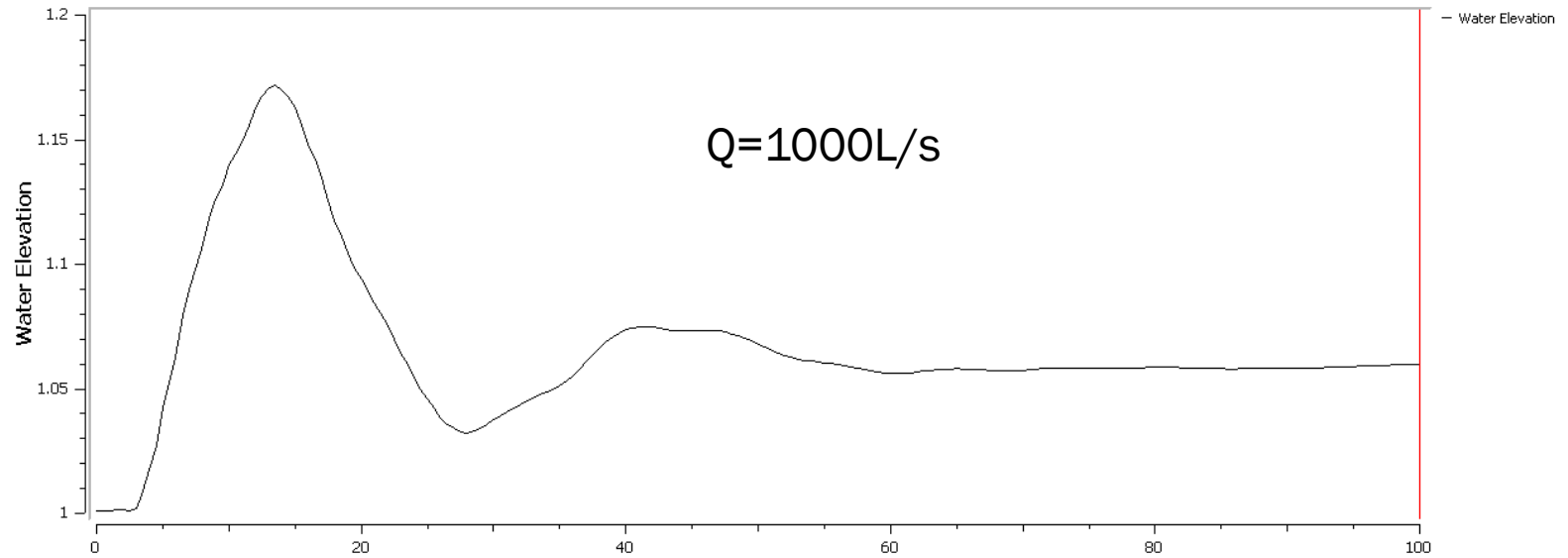
REZULTATI

NIVO NA OSI PRELIVA



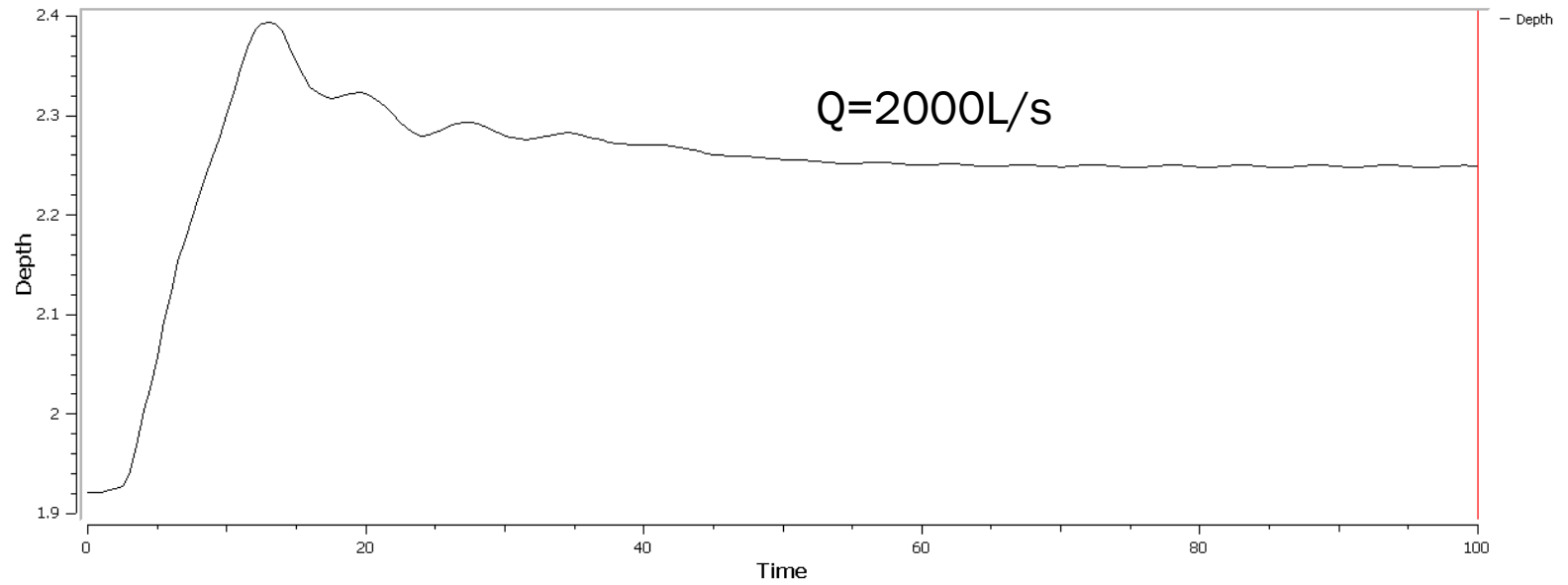
REZULTATI

NIVO NA OSI PRELIVA



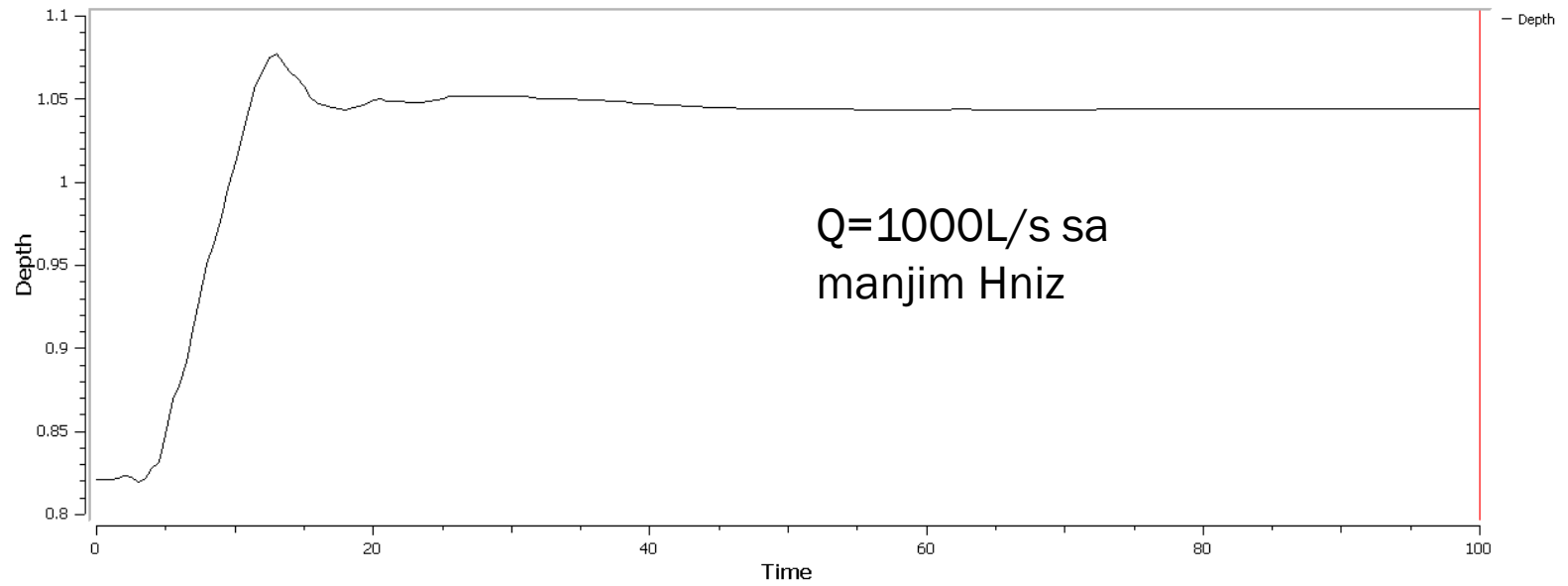
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NIVO NA OSI PRELIVA



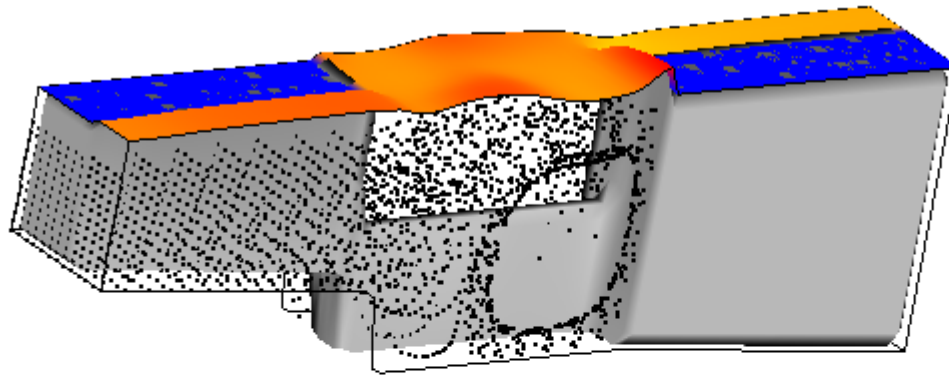
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NIVO NA OSI PRELIVA

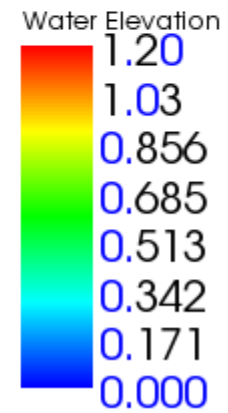


REZULTATI

particle



$Q=1000\text{L/s}$

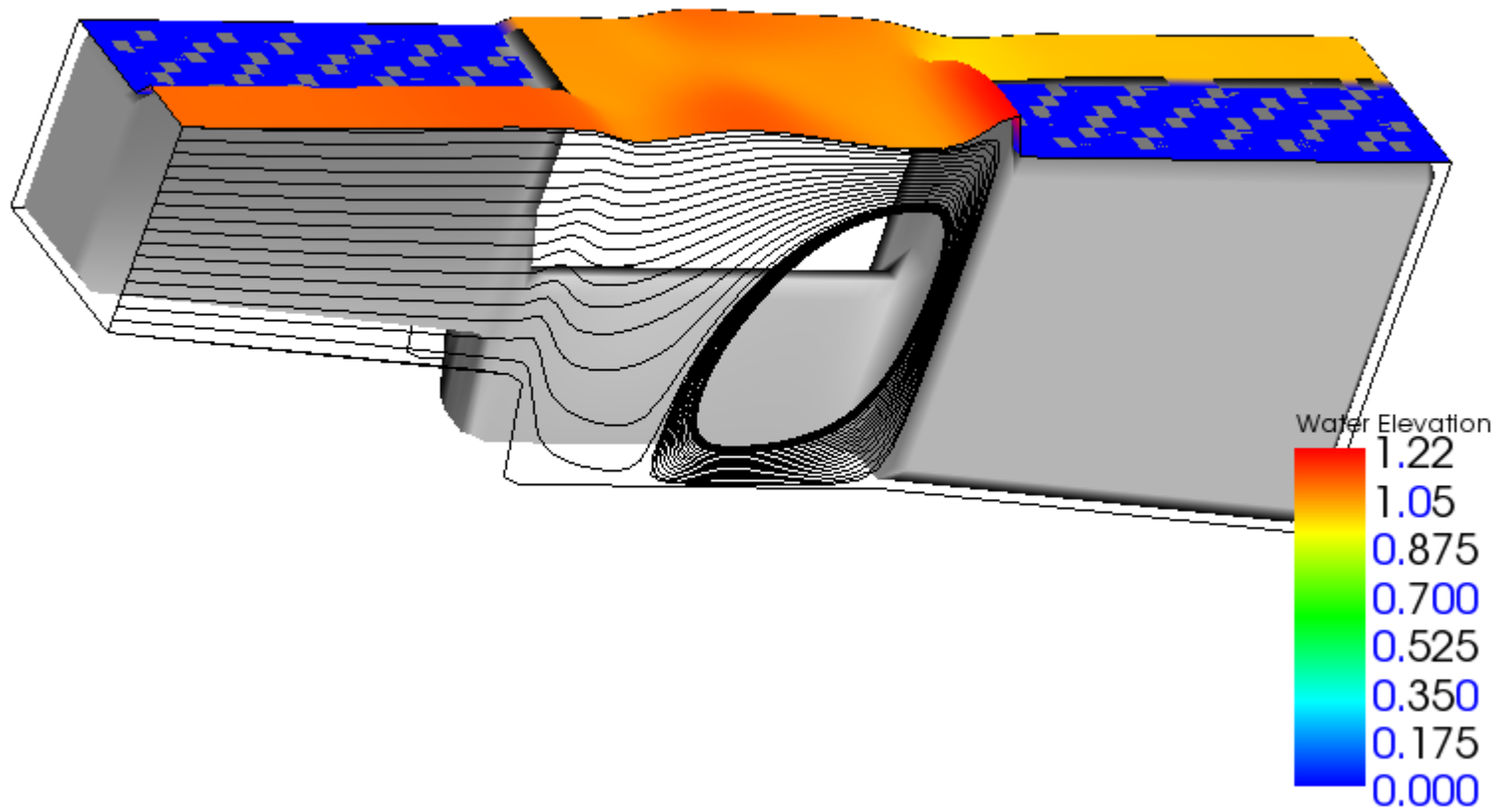


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REZULTATI

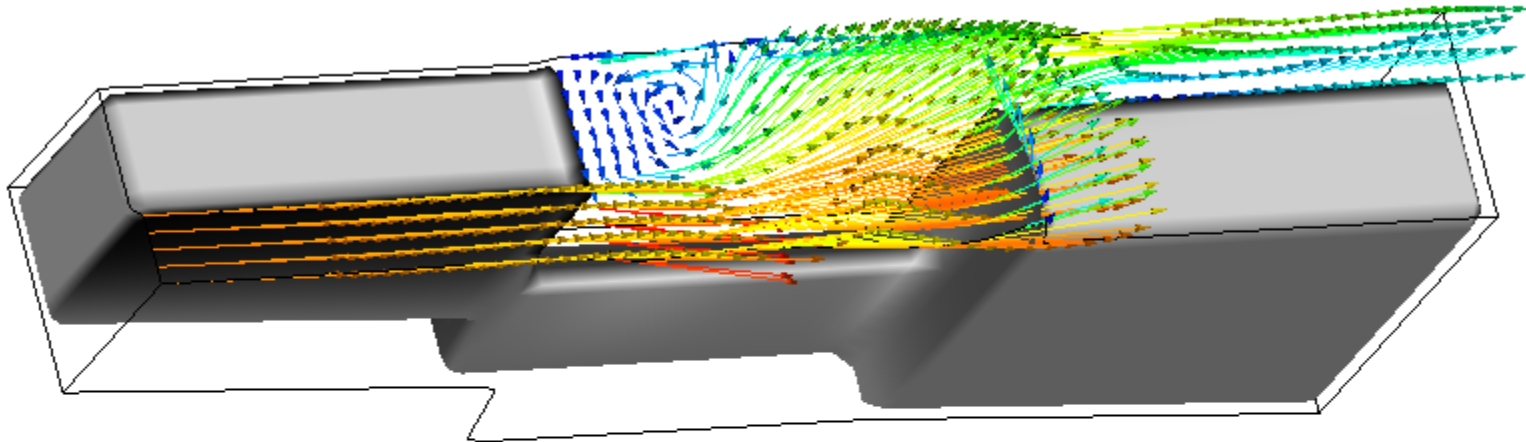
Strujnice



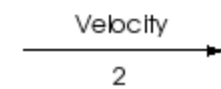
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REZULTATI

Vektori brzina



Time: 24 sec



ZAKLJUČAK

Zbog stabilnosti proračuna (CFL uslov) i praktičnosti bolje je usvojiti redju mrežu

Relativno dugo trajanje proračuna

Nemogućnost pauziranja proračuna

Dobar alat za neobično projektovanje (postojeći primer potopljenog bočnog preliva)

HVALA NA PAŽNJI

