L-113-02-64

International River Interface Cooperative

Training Session

Hosting:

Sinotech Foundation for R&D of Engineering Sciences & Technologies Hydrotech Research Institute, NTU Ecological Engineering Research Center, NTU Sinotech Engineering Consultants, Ltd.



nternational River Interface Cooperative

Training Session

Time	Session / Content	Host / Speaker
09:20~09:30	Registration	
09:30~09:45	Open Ceremony & General Overview of the iRIC Software	Dr. Jihn-Sung Lai Prof. Yasuyuki Shimizu
09:45~10:45	Basic flood Analysis and Its Utilization Using iRIC-Nays2D Flood : Training Session (1)	Dr. Takaaki Abe Civil Engineering Research Institute for Cold Region
10:45~11:00	Tea break	
11:00~12:00	Basic flood Analysis and Its Utilization Using iRIC-Nays2D Flood : Training Session (2)	Dr. Takaaki Abe Civil Engineering Research Institute for Cold Region

Audio-Visual Classroom 406 Hydrotech Research Institute, NTU Apr-27-2024

Hosting:

Sinotech Foundation for R&D of Engineering Sciences & Technologies Hydrotech Research Institute, NTU Ecological Engineering Research Center, NTU Sinotech Engineering Consultants, Ltd.

Co-sponsor:

Water Resources Committee, / Sustainable Development Committee of the Chinese Institute of Civil and Hydraulic Engineering

Co-organizer:

Dept. of Bioenvironmental Systems Engineering, NTU Dept. of Civil Engineering, NTU Dept. of Civil Engineering, NCHU Sinotech Engineering Consultants, Inc.

臺日「河川預警與模擬技術」交流講席會 Taiwan-Japan River Flood Warning and Simulation Technology Workshop

In today's world, water resource management and disaster prevention have become crucial issues that countries worldwide must collectively face. This is especially true in the context of research and application of river flood warning and simulation technologies, which are indispensable. Taiwan and Japan are two island nations that are prone to frequent earthquakes and often affected by typhoons. The river systems in Taiwan and Japan play vital roles, impacting various aspects such as agriculture, urban development, and ecological conservation. Thus, through the "Taiwan-Japan River Flood Warning and Simulation Technology Workshop", we explore and strengthen collaboration and communication between the two countries in this field.

Rivers are not only vital sources of water resources but also significant areas for human life and production. However, rivers also serve as important pathways for natural disasters, including disasters like floods and landslides, which frequently cause severe losses and disruptions. Consequently, the development of effective river flood warning systems and simulation technologies is crucial for ensuring the safety of people's lives and properties. Taiwan and Japan, being countries prone to earthquakes and typhoons, have profound needs and experiences in river flood warning and simulation technologies. While both countries have relatively well-developed hydraulic engineering and disaster prevention systems, they must continuously innovate and improve to confront new challenges like climate change. Through this workshop, we hope to collectively discuss the latest developments, research findings, and application cases of river flood warning and simulation technologies, seeking better ways to address future challenges. Furthermore, both countries possess abundant resources and advantages in technology and talent. Taiwan is home to many outstanding tech professionals and research institutions, while Japan has numerous globally recognized universities and research organizations. Through this workshop, we can promote technological exchange and cooperation between the two countries, jointly promoting innovation and application in river flood warning and simulation technologies. Therefore, this workshop is organized by the Sinotech Foundation for Research & Development of Engineering Sciences & Technologies, the Ecological Engineering Research Center of National Taiwan University, the Hydrotech Research Institute of National Taiwan University, and Sinotech Engineering Consultants, Ltd. Also co-sponsored by the Sustainable Development Committee of the Chinese Institute of Civil and Hydraulic Engineering and the Water Resources Committee of the Chinese Institute of Civil and Hydraulic Engineering. and The Department of Systems Engineering of National Bioenvironmental Taiwan University, the Department of Civil Engineering of National Taiwan University, and the Department of Civil Engineering of National Chung Hsing University, Sinotech Engineering Consultants, Inc. coorganizes the event.

The Sinotech Foundation for Research & Development of Engineering Sciences & Technologies is dedicated to elevating the domestic standards of hydraulic and civil engineering technology. In addition to actively gathering relevant domestic literature on hydraulic and civil engineering, the Foundation actively introduces advanced technologies from abroad. Hence, through this workshop, we invite academic institutions with substantial experience and expertise, such as Hokkai-Gakuen University in Japan, National Taiwan University, and National Chung Hsing University, to participate. Particularly in the fields of hydrology, water resource management, and geographic information systems, their participation will facilitate technical exchange and knowledge sharing, driving continuous innovation and improvement in river simulation technology. Additionally, the Foundation has invited the Japan River Information Center to participate in the workshop, facilitating the exchange of river hydrological data, meteorological information, and hydrological observation data. This is crucial for Taiwan's research and development of river flood warning systems. This workshop can promote cooperation between Taiwan and the Center, fully utilizing its rich data resources to ensure the reliability and accuracy of river flood warning systems.

We also hope that this workshop will provide an opportunity to promote cultural exchange and deepen friendship. Despite the geographical distance between Taiwan and Japan, there are many commonalities in culture, history, and values. Through the Taiwan-Japan River Flood Warning and Simulation Technology Workshop, we can deepen mutual understanding and friendship, collectively contributing more to global water resource management and disaster prevention. It will also strengthen cooperation and communication between the two countries in the field of water resource management and disaster prevention, promoting technological innovation and talent development, and making positive contributions to the sustainable development of the region and the world.

Basic Flood Analysis and Its Utilization Using iRIC-Nays2D Flood

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iRIC Software

Changing River Science

Nays2D Flood Examples

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iRIC version 4.0

Last Update: 2023.6.28 Release Date: 2023.6.28

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Contents CHAPTER 1 USING NAYS2D FLOOD 4 1. 2.3. 4. **CHAPTER 2 EXAMPLES OF FLOOD CALCULATION FOR AN** ACTUAL RIVER SECTION...... 10 Importing cross-sectional river survey data.....11 1 $\mathbf{2}$ Selecting an algorithm for creating a grid......17 3 8 9 10 11 121314 1516178 9

1. Cr	eating the calculation grid	55
1	Importing geographic data	55
2	Selecting an algorithm for creating the grid	59
3	Creating a grid	60

2.	Se	tting the calculation conditions	62
	1	Open [Calculation Condition]	62
	2	Setting the inflow boundary conditions	63
	3	Setting the initial water surface profile	66
2	4	Setting the time	67
ł	5	Other settings	68
(6	Inflow settings	69
,	7	Setting the roughness	75
8	8	Correcting elevation of sea area	78
3.	Ma	aking a simulation	80
4.	Vi	sualization of computational results	81
	1	Open the 2D Post-processing window	81
2	2	Quantities that can be visualized	82
	3	Visualizing the water depth	83
2	4	Visualizing flow vector	85
ł	5	Visualizing animated changes	86
(6	Visualizing time series data	87
5.	Im	portant information	91
СП	ΛC		
	•		02
IN A	٩C	TUAL RIVER	. 92
IN /	4C Cr	reating the calculation grid	. 92 93
IN /	AC Cr	reating the calculation grid Importing geographic data	. 92 93 93
IN /	AC Cr 1 2	reating the calculation grid Importing geographic data Selecting an algorithm for creating the grid	. 92 93 93 101
1.	AC Cr 1 2 3	TUAL RIVER reating the calculation grid Importing geographic data Selecting an algorithm for creating the grid Creating a grid	. 92 93 93 101 102
IN /	AC Cr 1 2 3 Se	reating the calculation grid Importing geographic data Selecting an algorithm for creating the grid Creating a grid tting the calculation conditions	. 92 93 93 101 102 . 104
IN /	AC Cr 1 2 3 Se 1	reating the calculation grid Importing geographic data Selecting an algorithm for creating the grid Creating a grid tting the calculation conditions Open [Calculation Condition]	. 92 93 93 101 102 . 104 104
IN /	AC Cr 1 2 3 Se 1 2	CTUAL RIVER reating the calculation grid Importing geographic data Selecting an algorithm for creating the grid Creating a grid tting the calculation conditions Open [Calculation Condition] Setting the inflow boundary conditions	93 93 101 102 .104 104 105
IN /	AC Cr 1 2 3 Se 1 2 3	CTUAL RIVER reating the calculation grid	93 93 93 101 102 104 104 105 107
IN /	AC Cr 1 2 3 Se 1 2 3 4	CTUAL RIVER reating the calculation grid	93 93 93 101 102 104 104 105 107 107
IN /	AC Cr 1 2 3 Se 1 2 3 4 5	CTUAL RIVER reating the calculation grid Importing geographic data Selecting an algorithm for creating the grid Creating a grid tting the calculation conditions Open [Calculation Condition] Setting the inflow boundary conditions Setting the initial water surface profile Setting the time Other settings	92 93 93 101 102 104 104 105 107 107 108
IN /	AC Cr 1 2 3 Se 1 2 3 4 5 6	CTUAL RIVER reating the calculation grid Importing geographic data Selecting an algorithm for creating the grid Creating a grid. tting the calculation conditions Open [Calculation Condition] Setting the inflow boundary conditions Setting the initial water surface profile. Setting the time Other settings Inflow settings	93 93 93 101 102 104 104 105 107 107 108 109
IN /	AC Cr 1 2 3 Se 1 2 3 4 5 6 7	CTUAL RIVER reating the calculation grid Importing geographic data Selecting an algorithm for creating the grid Creating a grid tting the calculation conditions. Open [Calculation Condition] Setting the inflow boundary conditions. Setting the initial water surface profile. Setting the time. Other settings Inflow settings Setting the roughness	93 93 93 101 102 104 104 105 107 107 107 108 109 113
IN / 1. 2. 3.	AC Cr 1 2 3 Se 1 2 3 4 5 6 7 7 Ma	CTUAL RIVER reating the calculation grid Importing geographic data Selecting an algorithm for creating the grid Creating a grid tting the calculation conditions Open [Calculation Condition] Setting the inflow boundary conditions Setting the inflow boundary conditions Setting the initial water surface profile Setting the time Other settings Inflow settings Setting the roughness aking a simulation	. 92 93 93 101 102 . 104 104 105 107 107 107 108 109 113 . 115
IN / 1. 2. 3. 4.	AC Cr 1 2 3 Se 1 2 3 4 5 6 7 7 Ma Vis	CTUAL RIVER reating the calculation grid Importing geographic data Selecting an algorithm for creating the grid Creating a grid tting the calculation conditions Open [Calculation Condition] Setting the inflow boundary conditions Setting the initial water surface profile. Setting the time Other settings Inflow settings Setting the roughness aking a simulation sualization of computational results	. 92 93 93 101 102 . 104 104 105 107 107 108 109 113 . 115 . 116
IN / 1. 2. 3. 4.	AC Cr 1 2 3 Se 1 2 3 4 5 6 7 Ma 7 Vis 1	CTUAL RIVER reating the calculation grid Importing geographic data Selecting an algorithm for creating the grid Creating a grid tting the calculation conditions Open [Calculation Condition] Setting the inflow boundary conditions Setting the inflow boundary conditions Setting the initial water surface profile. Setting the time Other settings Inflow settings Setting the roughness aking a simulation sualization of computational results Open the 2D Post-processing window	. 92 93 93 101 102 . 104 104 105 107 107 108 109 113 . 115 . 116 116
IN / 1. 2. 3. 4.	AC Cr 1 2 3 Se 1 2 3 4 5 6 7 Ma 7 Vis 1 2	CTUAL RIVER reating the calculation grid Importing geographic data Selecting an algorithm for creating the grid Creating a grid tting the calculation conditions Open [Calculation Condition] Setting the inflow boundary conditions Setting the initial water surface profile Setting the time Other settings Inflow settings Setting the roughness aking a simulation sualization of computational results Open the 2D Post-processing window Visualizing the water depth	92 93 93 101 102 .104 102 104 105 107 107 107 107 107 108 113 115 116 117
IN / 1. 2. 3. 4.	AC Cr 1 2 3 Se 1 2 3 4 5 6 7 Vis 1 2 3	CTUAL RIVER reating the calculation grid Importing geographic data Selecting an algorithm for creating the grid Creating a grid. tting the calculation conditions. Open [Calculation Condition] Setting the inflow boundary conditions. Setting the initial water surface profile. Setting the time. Other settings Inflow settings Setting the roughness aking a simulation. sualization of computational results. Open the 2D Post-processing window. Visualizing flow vector.	. 92 93 93 101 102 . 104 102 104 105 107 107 107 107 108 109 113 . 115 . 116 116 117 119

Chapter 1 Using Nays2D Flood

This manual explains the basic operation and startup procedures of Nays2D Flood, which is compiled with iRIC. TheNays2D Flood solver simulates two-dimensional plane river flow and riverbed deformation. It was developed by Professor Yasuyuki Shimizu of Hokkaido University. The following explanation is based on the assumption that you have installed the iRIC software on your computer. If you have not installed the iRIC software, download it from the following URL and install it on your computer.

URL:http://i-ric.org/downloadSoftware:iRIC version4.0 or later

1.Nays2D Flood basic operating procedures

The following are the basic procedures for operating Nays2D Flood with iRIC:

Launching Nays2D Flood Prepare to use Nays2D Flood on iRIC.

Creating the calculation grids

Create a grid for calculation using Digital Elevation Model (DEM) data or the like.

Setting the calculation conditions Set simulation discharge, boundary conditions, roughness and other items.

Making simulations Run Nays2D Flood for the simulation.

Visualizing the calculation results Visualize the simulation results, such as flow velocity, water depth and riverbed elevation, by means of a contour map/vector map to see whether the simulation has successfully run.

2. Launching Nays2D Flood

The following is the procedure to launch Nays2D Flood on iRIC.

When launching iRIC, the [iRIC Start Page] window will open. Click on [Create New Project] in the [iRIC Start Page] window.



The [Select Solver] window will open.

Select [Nays2D Flood v5.0] in the [Select Solver] window, and click on [OK].



A window with the title bar "Untitled-iRIC v4 [Nays2D Flood v5.0]" will appear.

Vuntitied - IRIC v4 4.0.0.6884 (Navs2D Flood v5.0.64 bit) - (Pre-processing Window)		×
Elle Import Georgaphic Data Grid Messured Values Calculation Condition Simulation CalculationRegist View Ontion Help		_ @ ×
	(5	Á
Object Browser X		
····································		
× 		R

Nays2D Flood v5.0 is ready for use.

3. The sample data

The sample data used for the sample simulations explained in this manual are available at:

URL: <u>http://i-ric.org/en/download</u> Examples of simulation: Nays2D Flood

To run Nays2D Flood according to this manual, data should be downloaded from the above site or provided by the staff in an iRIC training course.

The project files (*.ipro) in the description and sample data of each chapter in this manual is created by following solver. Although the project file cannot be used without change if the solver version is different, resetting calculation conditions and so on, following this manual enables calculation with other versions.

Solver: Nays2D Flood v5.0

Data name	Contents	version
N2F	Examples of flood calculation for an	Nays2D Flood 5.0
	actual river section	
N2F_2	Examples of tsunami runup analysis	Nays2D Flood 5.0
	using SRTM data	
N2F_3	Examples of rainfall induced flooding in	Nays2D Flood 5.0
	actual river	

Sample data and corresponding solver version

4. Simulation conditions of Nays2D Flood

This manual teaches how Nays2D Flood is used to simulate river flow during flood events for two relatively simple examples. There are some omissions in the explanations of the physical and numerical aspects of the simulation conditions that are to be set. Nays2D Flood has other functions (setting conditions) in addition to those explained by this manual and these two specific examples. For more complete details, please refer to the Nays2D Flood Solver Manual.

Chapter 2 Examples of flood calculation for an actual river section

Objectives

Simulate the flow regime (water depth and flow velocity) using Nays2D Flood for an actual river section with a flood discharge, and check to see whether the simulation is successfully run.

Outline

1. Creating the calculation grid

Using elevation data of an actual river section, create a calculation grid.

2.Setting the calculation conditions

Set flood discharge for unsteady flow. Set various other conditions necessary for simulation.

3. Making a simulation

4. Visualizing the calculation results

Here, we introduce how to display a water-depth contour map and a flow velocity vector map.

1. Creating the calculation grid

1 Importing cross-sectional river survey data

Importing geographic data

On the menu bar, select [Import] - [Geographic Data] - [Elevation].



Open [¥¥SampleData¥¥N2F], select [N2F.tpo] and click on [Open].

select file to import						
-> • 🕇 📕	> PC >	ボリューム (D:) > Sar	mpleData > N2F	~ č) / N2Fの検索	Ŕ
理 マ 新しいフォル	ダー					= • II (
 PC 3D オブジェクト ダウンロード デスクトップ ドキュメント ビクチャ 		N2Etpo	N2F_bak.tpo	Xa, qt1.csv	xa, qt2.csv	Xa, _{qt3.csv}
 ■ ビデオ ♪ ミュージック ■ Windows (C:) ↓ ポリューム (D:) ^{SU} SDXC (F) 	l					
Transcend (F:)	~					
77	イル名(N)	: N2F.tpo			 All importable< 聞く(Q) 	files (*.tpo *.csv ・ キャンヤル

On the dialog [Filtering Setting], input [1] for [Filter] value and select [OK].

Set a larger number for the filter value and filter the dataset if the operation is slow because of the high number of data points. The filter simply skips over the data; i.e., if the filter is one, each data point is read into iRIC, but if the value is two, only every other data point is read in, and so forth.

File name: D:¥SampleData¥N2F¥N2F.tpo Encoding: System ✓ Coordinate System Edit								
File Format								
Delir	miters							
Uelimiters								
Spec	cial characters							
Juo	ote character: "	😗 E	scape character: ¥		0			
Reco	ord options							
Header lines to ignore 0 📮 🗆 First header line contains field names								
Hea	der lines to ignore	0 📮 🗌 First he	eader line contains fie	ld names				
Heai Sele	der lines to ignore ct fields	0 📮 🗌 First he	eader line contains fie	ld names				
Hea Sele X: f	der lines to ignore oct fields field1 V	0 🗭 🗌 First he Y: field2	vader line contains fie	ld names 13	~			
Hea Sele X: f 3kip Skip	der lines to ignore rct fields field1 v rsetting o rate	0 🛊 🗌 First he	vader line contains fie	ld names 13	~			
Hea Sele X: f 3kip 3kip	der lines to ignore act fields field1 v a setting p rate 1 • 2	0 😧 First he	vader line contains fie	Id names 13	×			
Heal Sele X: f Skip Skip	der lines to ignore ict fields field1 ~ setting prate 1 = p //ew	0 😧 First he	V Value: field	Id names 13	~			
Heai Sele X: f Skip Skip	der lines to ignore fields field1 orat 1 view field1	0 Tirst he Y: field2	Value: field	Id names	~			
Hea Sele X: f Skip Skip	der lines to ignore not fields field setting view field 1 25986.329	0 First he Y: field2 field2 -22007.127	Value: field field3 251.930	Id names	~			
Heai Sele X: f Skip Skip ^o rev 1	Ines to ignore int fields field setting field view field 1 25986.329 12434.104	0 Image: First here Y: field2 -22007.127 -36164.716	Value: Field field3 251.930 148.959	I3	~			
Heai Sele X: f Skip Skip 1 2 3	der lines to ignore rot fields field ret field ret field ret field ret field field 25986.329 12434.104 12686.090	0 • First he Y: field2 -22007.127 -36164.243	Value: field 251.930 148.959 150.958	I3	~			

If the [Pre-Processing] window shows the shape of the river section that you are simulating, the data have been successfully imported.



Importing a background image

On the menu bar, select [Import] - [Background Image].



Background image

When creating grids for calculation, importing background images such as maps and aerial photos makes it possible to create grids that incorporate riverbanks and land use. Obstacle cells and roughness cells mentioned below can be set in reference to the background image.

Open [¥¥SampleData¥¥N2F] and select [N2F.jpg].



Using the [Move], [Rotate] and [Zoom] functions, match the background image with the elevation data.



Referring to the hint above, match the background image with the elevation data.



Click on [Background Image]-[N2F.jpg] on the object browser.

Fix the background image with [fix position].



You can also set the position of the background image by right-clicking the object browser [Background Image]-[N2F.jpg] and specifying coordinates from [Properties].

Reackground Image Position ? ×							
Method of designation Specify bottom-left vertex position, scale, and rotate angle Specify bottom-left and bottom-right vertex positions							
Bottom-left vertex Bottom-right vertex X: 10015.7000 ♀ X: 29527.1411 Y: -36823.9000 ♀ Y: -36776.5991							
Scale: 22.2734 Rotate Angle: 0.1389 Reset OK Cancel Apply					ply		

2 Selecting an algorithm for creating a grid

On the menu bar, select [Grid] - [Select algorithm to create grid]. The [Select Grid Creating Algorithm] window will open.



Select [Create grid from polygonal line and width] from the list below the [Select Grid Creating Algorithm] window, and click on [OK].

Nays2D Flood primarily creates a grid from polygonal lines and grid widths.

C Select Grid Creating Algorithm		?	×
Algorithm:	Description:		
Create grid from polygonal line and widt Create grid from cross-section data Create grid by dividing rectangular region Create grid by dividing rectangular region Create compound channel grid Create grid shape solving Poisson equatic General purpose grid generation tool u-shape grid generator for Nays3dv 2d arc grid generator for Nays3dv 2d arc grid generator (Compound Channe Grid Generator for Nays2Dv Grid Generator for Nays3Dv Multifunction Grid Genarator Simple Straight and Meandering Channel U-shape channel generator	First, please define polygonal line, b clicking. The polygonal line is used line of the grid. Then, you define th division number of grid in I direction direction.	y mouse as the c e width, ⊦and J	- enter
	ОК	Can	cel

3 Creating a grid

Right-click on several points through which the grid centerline passes, and press the

"Enter" key.



Set the grid centerline from the upstream end, where flood flow enters, to the downstream end, where the flood flow exits. To finish, doubleclick on the end of the centerline, or hit the "Enter" key.

In the [Grid Creation] window, make the following settings and click on [OK].



Number of divisions in the longitudinal direction : **63** Number of divisions in the transverse direction : **30** Grid width in the transverse direction : **6000 m**

Click on [Yes] in the [Confirmation] window.



A grid will be created.



It is possible to move, add or remove centerline points under [Grid Creating Conditions] even after the grid is created.

2. Setting the calculation conditions

8 **Open "Calculation Conditions"**

On the menu bar, select [Calculation Conditions] - [Setting].

The [Calculation Conditions] window will open.



9 Setting the inflow boundary conditions

Click on [Inflow/ Outflow Boundary Conditions] from the [Groups] list to make the following settings:

Calculation Condition	1		?	×
Groups Inflow/Outflow Initial Water Sur Time Others	Time unit of discharge/water surface file Boundary Conditions for)=1 Boundary Conditions for)=nj Water surface at downstream Constant value (m) Stage at downstream time series Rainfall Rainfall time series(mm/h)	Free c	Second Inflow Outflow Edit Edit	> > > > > O
Reset	0	К	Can	cel

Time unit of discharge/water surface elevation files: Second Boundary Conditions for j=1: Inflow Boundary Condition for j=nj: Outflow Water surface at downstream: Free Outflow Rainfall: without Note : Inflow conditions are decided at [6.Setting the inflow river conditions] Use constant value or read from file when the stage at downstream is effected by sea level or overflow level at the outflow.

10 Setting the initial water surface profile

Click on [Initial Water Surface Elevation] from the [Group] list to make the following settings:

R Calculation Condition			?	×	
Groups Inflow/Outflow Initial Water Sur Time Others	Initial water surface Initial water surface slope of main channel	Depth =	0.0	>	Initial water surface: Depth = 0 Note: When the water surface elevation of the downstream end may be affected by the sea level or the downstream flood level, use a constant value (a line).
Reset	C	Ж	Can	cel	

11 Setting the time

R Calculation Condition		? ×	
Groups Inflow/Outflow Boundar Initial Water Surface Time Others	Output time interval (sec) Calculation time step (sec) Start time of output (sec) Start time of bomber (sec)		Output time interval (sec): 600 Calculation time step (sec): 0.2 Start time of output (sec): 0 Start time of bomber (sec): 0
Reset		OK Cancel	

Click on [Time] from the [Group] list to make the following settings:

12 Other settings



Click on [Other] from the [Group] list to make the following settings:

Many other conditions can be set; however, they do not need to be set for this simulation as the default values are acceptable. After making the settings above, click on [Save and Close] to close the window.

13 Setting inflow rivers

Set the inflow rivers (or the bank opening point) at the upstream (red line) and right side (blue line) since you set the [boundary condition for j = 1] as [inflow] in the inflow/ outflow boundary conditions.



In this river section, two rivers (including agricultural canals) flow across the red line and one river flows across the blue line, as indicated by the red arrows. No river comes in the area from the outlet i=ni or the other bank j=nj and these boundary conditions are outflow only.

In the Object Browser, select [Boundary condition setting]-[Add inflow]



While selecting the [Inflow], enclose the sides of "Inflow" locations with polygons.

When the location is confirmed, the [Boundary condition] setting dialog opens.



🖋 Boundary Condition 🤉 🛛 🗙	
Type: Inflow Name: New Inflow1	
Discharge time series Edit Slope value at inflow 0.001	Name [:] arbitrary name, we use <mark>Ne</mark> Inflow 1 Slope value at inflow [:] 0.001
Color. ✓ Transparent 50 € Line Width: 7 €	
Show name OK Cancel	

In the [Boundar	y Condition], click	on [Discharge time	series]
-----------------	---------------------	--------------------	---------

A Boundary Condition ? X		
Type:	Inflow	
Name:	New Inflow1	
Setting		
Discharge time series Edit		
Slope value at inflow 0.001		
Color:		
🗹 Transparent 🗾 50 🖨		
Line Width: 7 🖨		
☑ Show name		
	OK Cancel	

In the [Calculation Condition], click on [Import]



In [Choose a text file] click on [qt1.csv] and then [open].

Open the discharge data.



Click on [OK].

Repeat above operations for New Inflow 2 to New Inflow 3.





Click on [Grid] on the menu bar [Attribute Mapping]-[Execute].

Position setting of inflow boundary condition

Inflow rivers are set on the sides.



14 Setting roughness condition

In the Object Browser, check [Grid] – [Cell attributes]-[Roughness condition].



Right-click on the object browser [Geographic Data]-[Roughness condition] and click [Add]-[polygon].


Click on Object Browser[Geographic Data]-[Roughness condition]—[Polygon1]. Double-click the cell with the same roughness surrounded by polygons. In [Edit Roughness condition value], directly input the desired Manning roughness.



Roughness condition:0.03

Note: Set Manning's roughness coefficient by taking comprehensive consideration of calculation model, land use and past flooding data.

In setting the roughness coefficient, refer to page 33 of Flood Simulation Manual (draft) and page 89 of Hydraulic Formula 1999 Edition (both in Japanese).

Click on [Grid] on the menu bar - [Attribute Mapping]-[Execute].



Roughness is reflected in the cell.



References:

Extract from pp. 33 of

Flood Simulation Manual (Draft) – Guide for simulation and verification of new model, Urban River Research Lab, River Section, Public Works Research Institute (Japan), February 1996

- Find the area of each land use within each mesh. Land use: building; farmland A₁, road A₂ and other land use A₃. Here, "farmland" means rice paddy, upland field or orchard. "Road" includes sidewalks along the road. Wilderness, grass fields and wetlands are included in "other land use."
- 2) The roughness coefficients by land use are set as follows: The bottom roughness coefficient other than that of buildings is calculated from the following weighted average:

```
エラー! 編集中のフィールド コードからは、オブジェクトを作成できません。
where, n<sub>1</sub>=0.060, n<sub>2</sub>=0.047 and n<sub>3</sub>=0.050.
```

3) The composite equivalent roughness coefficient of the land and buildings is given by the following equation:

エラー! 編集中のフィールド コードからは、オブジェクトを作成できません。 where, θ is the proportion of land occupied by buildings and *h* is water depth.

15 Setting obstacle cells

In the Object Browser, check [Grid]-[Cell attributes]-[Obstacle].

Right-click the object browser [Geographic Data]-[Obstacle] and click [Add]-[Polygon].

Click the object browser [Geographic Data]-[Obstacle]-[Polygon1]. Double-click a cell that will become an obstacle cell with polygons. In [Edit Obstacle value], select Obstacle.

Set obs tacles such as roads, banks and embankments.

Note: Unless the calculation grid cells are small enough to depict roads, banks and embankments as a part of the topography, set roads, banks and embankments as obstacles.

Click on [Grid]on the menu bar -[Attribute Mapping]-[Execute].

Obstacle is reflected in the cell.

Repeat above operations from Polygon1 to Polygon2.

16 Setting Areal fraction that buildings occupy

Right-click the Object Browser [Geographic Data] - [Areal fraction that buildings occupy] and click [Add] - [Polygon].

Click the Object Browser [Geographic Data]-[Areal fraction that buildings occupy]-[Polygon1]. Double-click the cell with the same building occupancy surrounded by polygons.

In [Edit Areal fraction that buildings occupy value], enter directly the building occupancy fraction.

Building occupancy ratio: 0.3

Note: Resistance by buildings is based on the phenomenon that flow is affected by buildings and flooding occurs in buildings. For this reason, the premise differs from the abovementioned obstacle setting, so be careful.

If the areal fraction that buildings occupy is larger than 0.95, the model set the value to 0.95. Because this model is a model for permeable obstacles and can not consider completely impermeable obstacles.

When you want to put impermeable obstacles, please use [Obstacle cell].

est_tmp1/pro-iRIC v4.4.0.0684 [Nays2D Rood v5.0 64 bit] File Import Geographic Data Grid Measured Values Calculation C Image: C × $\begin{array}{c} Z_{X} \leftarrow \rightarrow \uparrow \downarrow \textcircled{O} \textcircled{O} \textcircled{O} \end{array} \begin{array}{c} & & \\ \end{array} \begin{array}{c} & \\ \end{array} \begin{array}{c} Z_{Z} & \\ \end{array} \begin{array}{c} Z_{Z} & \\ \end{array} \begin{array}{c} Z_{Z} \end{array} \begin{array}{c} \end{array} \end{array} \begin{array}{c} Z_{Z} \end{array} \begin{array}{c} Z_{Z} \end{array} \begin{array}{c} Z_{Z} \end{array} \end{array} \begin{array}{c} Z_{Z} \end{array} \begin{array}{c} Z_{Z} \end{array} \end{array} \begin{array}{c} Z_{Z} \end{array} \begin{array}{c} Z_{Z} \end{array} \end{array} \end{array} \end{array}$ \end{array} \end{array} \end{array} Bondary Conditions Pare processing Wards Object Biowaie Pare processing Wards Object Biowaie Pare processing Wards Object Biowaie Pare processing Wards Pare proces ng Windov Pre-p 2 ••• 1 Areal fra tion 0.30 0.22 Background Images (Int...) 面土地理院(標準地...) Axes Distance Measures 計測1 015 0.07 000

Click the menu bar [Grid]-[Attribute Mapping]-[Execute].

The building occupancy rate is reflected in the cell.

Set "inside" geometry of box culvert.

Click the Object Browser [Boundary Condition Setting]-[Add Box culvert].

Pass the water through the box culvert to the road set for the obstacle cell.

Note: The setting method of gate, pump is the same as the setting method of box culvert.

Click the Object Browser [Grid] – [Boundary Condition Setting] – [New Box Culvert]. Surround the cell at the "inlet" position of the box culvert with polygons.

In the figure on the left, the object browser [grid] -[cell attribute] - [obstacle cell] is checked so that the location of the obstacle cell can be seen on the figure.

Double-click to confirm the position of "inside".

The boundary Condition screen is displayed.

Change the name on [Boundary Condition] screen to [new Box Culvert_in] and set it as an inside.

ype: BoxCulvert		
Setting		
Coupling code number	1 🖨	
Inlet/Outlet	Inlet \sim	Name:arbitrary, we use New
Width(m)	1	Box Culvert_in
Height(m)	1	A couple of code number: 1 Inlet/Outlet: Inlet
Elevation(m)	140	Width(m): 1
Multiply	1	Height(m): 1 Elevation(m): 140
Extended formula	No ~	Multiply: 1
Coefficient of submerged flow	0.75	Extended formula : No Coefficient of submerged flow:
Coefficient of subsurface flow	0.51	0.75
Coefficient of free flow	0.79	Coefficient of free flow: 0.79 Note: Combine the code numbe
Color:		at inlet/outlet.
7 Transparent 50		

Set "Outside" of the Box culvert.

In the Object Browser, select [Boundary condition setting]-[Add Box Culvert]

Click the Object Browser [Boundary Condition Setting]-[New Box Culvert]. Enclose the cell at "outside" position of the box culvert with polygons.

Double-click to set the position of "outside".

The Boundary Condition screen is displayed.

Set the conditions of the box culvert from the dialog.

ame: New BoxCulvert_out		
Coupling code number	1 🖨	
Inlet/Outlet	Outlet $$	
Width(m)	2	
Height(m)	2	
Elevation(m)	0	
Multiply	1	
Extended formula	No 🗠	
Coefficient of submerged flow	0.75	
Coefficient of subsurface flow	0.51	
Coefficient of free flow	0.79	
Color: Color: Transparent Transparent 50		
	_	_

On the menu bar, select [Grid] - [Attributes Mapping] - [Execute...]

The box culvert is set in the cell.

3. Making a simulation

On the menu bar, select [Simulation] - [Run]. Save the project.

The [Solver Console [Nays2D Flood] (running)] window will open to start the simulation.

4. Visualizing the calculation results

8 Open the "2D Post-Processing" window

On the menu bar, select [Calculation Result] - [Open new 2D Post-Processing Window].

le Import Ca	Iculation Condition	Simulation	alculation Result View Option Help		
() 💾 🚺		~ 0	🔒 Open new 2D Post-Processing Window 💿 🕨 📄 🖉 🗾 💋 🚮 🗠 🗽 🝳	0 1	
2400.000	41.5750	0.0000	Open new 2D Bird's-Eye Post-Processing Window		
3000.000	58.1450	0.0000	Open new 3D Post-Processing Window		
3600.000	66.4552	0.0000			
4200.000	74.3554	0.0000	C Open new Graph Window		
4800.000	105.8555	0.0000	Open new Scattered Chart Window		
5400.000	138.2257	0.0000			
6000.000	142.8413	0.0000	Copen new verification window		
6600.000	137.6788	0.0000	Reload		
7200.000	141.4244	0.0000	, mean		
7800.000	117.9024	0.0000	Delete		
9000.000	95 2586	0.0000	Manage simple operation regular		
9600.000	76,7353	0.0000	manage simple operation results		
10200.000	71.6334	0,0000	Import_		
10800.000	49.4765	0.0000	Empert		
11400.000	71.5822	0.0000	Exports		
12000.000	125.1368	0.0000	Export solver console log		
12600.000	161.6364	0.0000	Insurant Manufacture Manufacture		
13200.000	228.1167	0.0000	import visualization/Graph Settings		
13800.000	288.2414	0.0000	Export Visualization/Graph Settings		
14400.000	303.6077	0.0000			
15600.000	341 7292	0.0000	0.0000 out		
16200.000	415,1538	0.0000	0.0000 out		
16800.000	417,3801	0.0000	0.0000 out		
17400.000	432.9158	0.0000	0.0000 out		
18000.000	476.2572	0.0000	0.0000 out		
18600.000	465.8841	0.0000	0.0000 out		
19200.000	461.8154	0.0000	0.0000 out		
19800.000	432.8071	0.0000	0.0000 out		
20400.000	379.2430	0.0000	0.0000 out		
21000.000	341.3872	0.0000	0.0000 out		
21600.000	254.4899	0.0000	0.0000 out		
22200.000	142 3362	0.0000	0.0000 out		
23400.000	70 2165	0.0000	0.0000 out		
24000.000	43.8789	0.0000	0.0000 out		
24600.000	20.3657	0.0000	0.0000 out		
25200.000	12.4907	0.0000	0.0000 out		
Finish	0				
Calcurati	on time 84.	00000	ec.		
Calcurati	on time 1.4	00000	in.		
Calcurati	on time 2.33	33333E-02	our.		

The "Post-Processing (2D)" window will open.

9 Visualizable quantities

DESCRIPTIONS IN THE OBJECT	DESCRIPTION OF EACH QUANTITY
BROWSER	
• CONTOUR	
DEPTH(MAX)	The max. water depth by the time of
	visualization (m).
DEPTH	The water depth at the time of visualization
	(m)
ELEVATION	The ground height of calculation grid (m)
WATERSURFACEELEVATION	The water surface elevation at the time of
	visualization (m)
VELOCITY (MAGNITUDE MAX)	The max. flow velocity by the time of
	visualization (m/s)
VELOCITY (MAGNITUDE)	Flow velocity at the time of visualization
	(m/s)
• VECTOR	
VELOCITY	Vector of flow velocity (m/s) at the time of
	visualization
• STREAMLINE	
VELOCITY	Displays a streamline.
• PARTICLES	
VELOCITY	Displays particles.
• CELL ATTRIBUTES	
OBSTACLE CELL (A NORMAL	Displays a normal cell.
CELL)	
OBSTACLE CELL (A CELL WITH	Displays an obstacle cell.
AN OBSTACLE)	
BOMBER CELL (A NORMAL CELL)	Displays a normal cell.
BOMBER CELL (A CELL WITH	Displays an bomber cell.
ANBOMBER)	

10 Visualizing the max. water depth

In the Object Browser, select [Nays2D Flood Grids] - [iRICZone] – [Scalar] - [Depth (Max)].

A contour map of water depth will open.

In the Object Browser, select [Nays2D Flood Grids] - [iRIC Zone] - [Scalar]. Rightclick on [Depth(max)] to select [Property].

The [Contour Setting] window will open.

In the [Contour Setting] window, make the following settings and click on [OK].

Color Range			
Presets: (Please select it) Ignore Color bar setting when impor Relationship between values and colors @ Automatically adjust based on value range Setup Manually Value Range Automatic Mar: 01 Colors Value Color Add 1 1 2 07225 3 0505 3 0505 5 001 Fill bover area P Fill upper area Switch to Discrete Mode Inport Export Value Color Add Persone	tine Color Bar Satting Visibility Wein selected Aways Never Director: Horizontal Vertical Title : earth/Max. Font Satting: MS UI Gothic 14 pt Edit. Latel Display Format: MS 21 Format: MS 21 F	Apply	Value range : Remove ☑ from Automatic Max : 1 Min : 0.01 Colors : No change Remove ☑ from Fill lower area Transparent: No change Color Bar Setting: No change

The contour map is clear.

11 Visualizing the max. flow velocity

In the Object Browser, check [Nays2D Flood Grids] - [iRIC Zone] - [Scalar] - [Velocity (magnitude Max)].

Value range : Remove ☑ from Automatic Max : 2 Min : 0.01 Colors : No change Remove ☑ from Fill lower area Transparent: No change

Color Bar Setting: No change

12 Visualizing the inflow discharge hydrograph

Open [New Graph Window].

C. Data Source Setting			?	×	
X Axis: Time V Calculation Result Externa	ıl				
Point Data		Selected Data			
New BoxCulvert_out New Inflow1 New Inflow2 New Inflow3	Add >>				Unit: m³/s
Grid Location: Vertex Depth Elevation WaterSurfaceElevation Velocity (magnitude Max) IBC Velocity(ms-1) (magnitude)	((Remove	Setting			
		ОК	Can	cel	

[Data Source Setting] screen is displayed.

Select [Calculation Result] - [Point data] - [New Inflow1], [New Inflow2] and [New Inflow3] - [Add].

The hydrograph of the incoming river is displayed.

Select [Calculation Result] - [Point data] –[New Box Culvert_in], [New Box Culvert_out] - [Add].

The hydrograph of box culvert is displayed.

Chapter 4 Examples of Rainfall Induced Flooding in Actual River

Objectives

The objectives are to use Shuttle Radar Topography Mission (SRTM) data, to simulate and visualize the simulated flow regime, such as water surface elevation and flow velocity, at a river when rainfall induced flooding occurs with Nays2D Flood.

Outline

1. Creating the calculation grid

Using elevation data of an actual river basin, create calculation grids: 101 division points in the transverse direction, and 131 division points in the longitudinal direction.

2. Setting the calculation conditions

Set a value for Elevation, Rainfall and Inflow Discharge. Set various other conditions necessary for simulation.

3. Making a simulation

4. Visualizing the calculation results

Here, we introduce how to display a water depth contour map and a flow velocity vector map.

1. Creating the calculation grid

In the Object Browser, click [Option]-[Preferences]

In [Preferences] scroll to [Background Images (Internet)]

Select [GSI (English) (Japan only)] and [GSI (Ortho images) (Japan Only)]

In the Object Browser, right-click [Geographic Data]-[Elevation].Click [Import elevation from web].

Untitled - IRIC v4 4.0.0.5884 [Nays2D Flood v5.0 64 bit] - [Pre-processing Window]	- 🗆 ×
ile Import Geographic Data Grid Measured Values Calculation Condition Simulation Calculation Result View Option Help	- 6
• (5 💾 💽 🕐 🛇 ↦ ~ Q 🗓 ێ 🗺 Yy Zy Zy ← → ↑ ↓ 😡 Q 🍉 🔳 🦯 🖿 🚛 🚛 🗠	1. R () A
♥ III	
Object Browser ×	
Geographic Data	
Devation	
View View + Import Elevation from web	
Dependent Add	
Boudness (E. Funet & Belineers	
Areal fractic	
Reference Ir 💊 Color Setting	
Grid Creating C in Delete Selected	
E boundary Cond in Delete All_	
V V Grid [No Data]	
Boundary Condit	
Resured Values	
Background Images	
V background images	
Georgie Map (201	
Goode Man (A	Elevation
Google Map (Ma.	0.00
Open Street Map	0.00
[] 国土地理院 (標	0.00
🗌 🗋 国土地理院(淡	0.00
□ □ 国土地理院 (Eng	0.00
	0.00
Axes	ĭ₽2/
V L Usatike measures	
E medsure V	
	4: -2.151453 Y: 1.245472

[Select Region] screen is displayed. Drag the target part and click [Next].

[Select Coordinate System] screen is displayed.

Search with JGD and select [EPSG:2454:JGD2000/Japan Plane Rectangular CS XII].

R Select Coordinate System	?	\times
Search: japan		
EPSG:2446: JGD2000 / Japan Plane Rectangular	CS IV	^
EPSG:2447: JGD2000 / Japan Plane Rectangular	CS V	
EPSG:2448: JGD2000 / Japan Plane Rectangular	CS VI	
EPSG:2449: JGD2000 / Japan Plane Rectangular	CS VII	
EPSG:2450: JGD2000 / Japan Plane Rectangular	CS VIII	
EPSG:2451: JGD2000 / Japan Plane Rectangular	CS IX	
EPSG:2452: JGD2000 / Japan Plane Rectangular	CS X	
EPSG:2453: JGD2000 / Japan Plane Rectangular	CS XI	
EPSG:2454: JGD2000 / Japan Plane Rectangular	CS XII	
EPSG:2455: JGD2000 / Japan Plane Rectangular	CS XIII	\sim
<	>	
Hint about Japanese coordinate systems (EPSG:24	143 - 246	<u>i1)</u>
Hint about UTM coordinate systems (EPSG:32601	- 32760	etc.)
ОК	Cancel	

Select [GSI (English)(Japan Only)] in Background Images [Zoom In] towards 'Japan'

[Zoom In] towards 'Japan' so that you can spot 'Sapporo'

[Zoom In] towards 'Sapporo' Try to Spot 'Chitose' and [Zoom In] towards 'Chitose'

[Zoom In] towards 'Chitose' so that you can spot 'Lake Utonai'

Drag the target part and click [Next].

[Zoom Level Setting] screen will be displayed. Specify the zoom level and select the source

🔎 Zoom Level Setting	?	\times
Specify the zoom level of data you want to Zoom level: 11 🖨	import.	
Resolution: 56.1319 m Data size: 1 MB (393216 points)		
Source: USGS elevation tiles (SRTM	1)	•
OK	Cano	cel

Zoom level: 11 Source: USGS (SRTM)

Note: Since the resolution of the SRTM data is 90 m mesh, even if the zoom level is set to 11 or more here, the data does not change because the maximum resolution has been reached. Therefore, the zoom level is set to 11.

Reading is successful if the shape of the watershed to be calculated is displayed on [Preprocessing Window] screen.

When one of the items in the background image of the object browser is checked, the background image is displayed.

When creating grids for calculation, importing background images such as maps and aerial photos makes it possible to create grids that incorporate riverbanks and land use. Obstacle cells and roughness cells mentioned below can be set in reference to the background image.

Since the coordinate system is selected, it is set automatically

R ex3.ipro - iRIC v4 4.0.0.6884 [Nays2D Flood v5.0 64 bit] - [Pre-processing Window] File Import Geographic Data Grid Measured Values Calculation Condition Simulation View Calculatio n Result Option Help
 Image: Select Algorithm to Create Gold.
 Select Algorithm to Create Gold.

 Object Browser
 Geographic Data
 ¥ 🔍 Q 🕨 🔳 🦯 🎬 🔽 💋 🗤 🗠 🔍 Q, 🝼 k -> Ť Á 1 4 Geographic Data Geographic Data Elevation Obstacle Xrain Create Grid... Attributes G r 100 12 Attributes Mapping Edit
 Y
 Xrain
 Edit

 Y
 Bomber
 Delete...

 Y
 Roughness cond
 Display Setting...

 Areal fraction th
 Open Bird's-Eye View Window

 Grid Creating Condi
 Add New Grid

 Boundary Condition
 Import...

 Y
 Grid (12: 101 = 12)

 Export...
 Export...
 . ● Measured Values ● Background Images ● Background Images (Int. ● Ackes ● Distance Measures ● ■ 計測1 13 A X:

On the menu bar, select [Grid] - [Select algorithm to create grid]. The [Select Grid Creating Algorithm] window will be displayed.

Select [Create grid from polygonal line and width] from the list under the [Select Grid Creating Algorithm] window, and click on [OK].

Nays2D Flood generates a grid from polygonal lines and widths.

R Select Grid Creating Algorithm		?	\times
Algorithm:	Description:		
Create grid from polygonal line and widt Create grid from cross-section data Create grid by dividing rectangular region Create grid shape solving Poisson equation General purpose grid generation tool u-shape grid generator for Nays3dv 2d arc grid generator for Nays3dv 2d arc grid generator (Compound Channe Grid Generator for Nays2Dv Grid Generator for Nays3Dv Multifunction Grid Genarator Simple Straight and Meandering Channel U-shape channel generator	First, please define polygonal line, by clicking. The polygonal line is used as line of the grid. Then, you define the division number of grid in I direction direction.	mouse- s the ce width, and J	nter
	OK	Cano	el

3 Creating a grid

Click on several points through which the grid centerline passes and press the Enter key on your keyboard to draw a centerline.

In the [Grid Creation] window, make the following settings and click on [OK].

[nj] (Number of divisions in the longitudinal direction): 120
[ni] (Number of divisions in the transverse direction): 100
[W] (Grid width): 10000 m
Note: In this example, grid cell intervals di, dj are set at around 70 and 100 m
respectively.

Click on [Yes] in the [Confirmation] window.

A grid will be created.

2. Setting the calculation conditions

1 Open [Calculation Condition]

On the menu bar, select [Calculation Condition] - [Setting].

The [Calculation Condition] window will open.

2 Setting the inflow boundary conditions

Click on [Inflow Boundary Condition] from the [Group] list to make the following settings: Click on [Stage at downstream time series] to edit.

The [Calculation Condition] window will open.

R Calculation Condition	1	? ×	
Groups Inflow/Outflow Initial Water Sur Time Others	Time unit of discharge/water surface file Boundary Conditions for j=1 Boundary Conditions for j=nj Water surface at downstream Constant value (m) Stage at downstream time series Rainfall Rainfall time series(mm/h)	Hour ~ Inflow ~ Outflow ~ Free outflow ~ O Edit with ~ Edit	[Time unit of discharge/water surface file]: Hour [Boundary Conditions for j=1]: Inflow [Boundary Conditions for j=nj]: Outflow [Water surface at downstream]: Free Outflow Rainfall: with Rainfall time Series: Import Chitose_Rainfall.csv from test file
Reset	0	IK Cancel	

Click on [Import] on the [Calculation condition] window.

The [Select text file] window will be displayed.



Select [¥¥SampleData¥¥N2F_3] - [Chitose_Rainfall.csv] and click on [Open].

Time series of rainfall data is displayed.

💦 Choose a text file							×	(
← → × ↑ 📕 >	PC >	ポリューム (D:) > SampleData > N2F_3	~	Ü	Q	N2F_3の検索		
整理 ▼ 新しいフォル	ダー					□ □ □	• •	
S PC	^	名前	更新日時			種類	サイズ	
🧊 3D オブジェクト		BibiRiver_inflow_dammy.csv	2020/09/12	22:20		Microsoft Excel CS		1
🖊 ダウンロード		Chitose_Rainfall.csv	2020/09/12	22:17		Microsoft Excel CS		1
🔲 デスクトップ								
🛗 ドキュメント								
📧 ピクチャ								
📑 ビデオ								
🎝 ミュージック								
💺 Windows (C:)								
🧩 ボリューム (D:)								
SDXC (E:)								
Transcend (F:)	~ <							>
٦٣ [.]	イル名(ト	I): Chitose_Rainfall.csv		~	Text	files (*.csv *.txt)	\sim	
						開く(O) キャ	ンセル	

Click on [OK].

Here, we assume a tsunami whose wave height is 7 m and half-wavelength is 600 sec.



The time steps of the tsunami wave height must be kept at the same value, including at the inflow location.

3 Setting the initial water surface profile

R Calculation Condition			?	×	
Groups Inflow/Outflow Initial Water Sur Time Others	Initial water surface Initial water surface slope of main channel	Constant	slope \ 0.000	1	Initial water surface: constant slope Initial water surface slope of main channel: 0.0001
Reset	c	к	Cance	el	

Click on [Initial Water Surface] from the [Group] list to make the following settings:

4 Setting the time

Click on [Time] from the [Group] list to make the following settings:

R Calculation Condition		?	Х	
Groups Inflow/Outflow Boundar Initial Water Surface Time Others	Output time interval (sec) Calculation time step (sec) Start time of output (sec) Start time of bomber (sec)		360 1 0	Output time interval (sec): 360 Calculation time step (sec): 1 Start time of output (sec): 0 Start time of bomber (sec): 0
Reset		ОК С	ancel	

5 Other settings

Click on [Others] from the [Group] list to make the following settings:

R Calculation Conditio	n	? ×	Finite differential method of advection terms: CIP method
Groups Inflow/Outflow Initial Water Sur Time Others	Finite differential method of advection terms Maximum number of iterations of water surface calculation Relaxation coefficient for water surface calculation Minimum water depth A for eddy viscosity coefficient (k/6u*h x A + B) B for eddy viscosity coefficient (k/6u*h x A + B) Number of threads for paralle computation (Only multi core PC) Inundation of buildings Model parameter for flow resistance by buildings How to calculate gamma	CIP method ~ 10 (*) 08 001 1 0 1 (*) Disabled ~ 0383 gam_x=gam_y=1-sqrt(1-gam_v) ~	Maximum number of iterations of water surface calculation: 10 Relaxation coefficient for water surface calculation: 0.8 Minimum water depth: 0.01
Reset		OK Cancel	A of eddy viscosity coefficient: 1
			B of eddy viscosity coefficient: 0

After making the settings above, click on [Save and Close] to close the window.

6 Inflow settings

Nays2D Flood requires at least one inflow location to be set on the upstream end.



In the Object Browser, right-click [Boundary Condition Setting] and click [Add Inflow].

In the Object Browser, click [Boundary Condition Setting]-[Add Inflow]. Surround the side of the position of the incoming discharge with polygons.



Zoom the Grid to make it easier to add Inflow points.

Mouse Hint: Ctrl+Mouse wheel = Zoom IN/Zoom OUT



Double-click to confirm and the [Boundary condition] screen will be displayed.

On the [Boundary Condition] window, input "Inflow 1" to the [Name] box, and select [Edit] for the [Discharge time series] box under [Setting].



The [Calculation Condition] window will be displayed.

Open [¥¥SampleData¥¥N2F_3], select [BibiRIver_Inflow_dummy.csv] and click on [Open].

Time series dummy discharge data (all discharges are zero) will be displayed.

Choose a text file	•					×
← → ~ ↑	> PC	> ボリューム (D:) > SampleData > N2F_3	ٽ ~		○ N2F_3の検索	
整理▼ 新しいこ	オルダー				₿== ▼ [
🧢 PC		~ 名前	更新日時		種類	サイズ
🧊 3D オブジェク		BibiRiver_inflow_dammy.csv	2020/09/12 22:2	C	Microsoft Excel CS	1
)	Chitose_Rainfall.csv	2020/09/12 22:1	7	Microsoft Excel CS	1
シーボリューム (D: シン SDXC (E:)						
Transcend (F	:) ~	<				>
	ファイル名	(N): BibiRiver_inflow_dammy.csv		~ I	「ext files (*.csv *.txt) 開く(O) キャ.	~ ンセル

Click on [OK].

Discharge time	series		/ X	🙋 Boundary Condition 🧧 🛛 🗙
Time 1 0 2 1 3 2 4 3 5 4 6 5 7 6 9 8 9 9	Discharge(m3/s) 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0.6 0.4 0.4 (§ 0.2 € 8 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		Type: Inflow Name: New Inflow Setting Discharge time series Edit Slope value at inflow Color: Transparent 50 Line Width: 7 Show name
Inport	Add Rer Export Clear	-0.6 -), move 0 2	4 6 8 10 12 Time OK Cancel	OK Cancel



In the menu bar, click [Grid]-[Attributes Mapping]-[Execute].

In Attribute Mapping bar -click [Check All]- [OK]

Attribute Mapping ?	×
Geographic Data Geographic Data Elevation Obstacle Xrain Bomber Roughness condition Areal fraction that buildings occupv(max=0.95)	
Boundary Condition Setting Image: Check All OK Cance	

7 Setting the roughness

In the Object Browser, select [Geographic Data] - [Roughness] and right click to select [Add] - [Polygon].



Click on several points to set several vertices such that the vertices enclose the grid area, and press the Enter key on your keyboard to complete the operation. Then, input a value of Manning's roughness coefficient for [Roughness condition] in the [Edit roughness condition value] window.



Setting Polygon

A polygon is set by enclosing the area by the line linking vertices made by clicking the location you want to set as a vertex. To finish, press the Enter key or double click.

Note: When setting Manning's roughness coefficient, first you make a polygon that encloses all grid nodes. In this example, you want to set the same roughness condition for the entire grid.

3. Making a simulation

R ex3.ipro - iRIC v4 4.0.06884 [Nays2D Flood v5.0 64 bit] - [Pre-processing Window]		×
🌽 File Import Geographic Data Grid Measured Values Calculation Condition Simulation Calculation Reserving Option Help		_ 8 ×
[= ()]] @ 🗨 🛇 ∽ ~ (Q, [] : K. Y, Z, Z, ← → ↑ ↓ (Q, Q) ▶ 🗊 🦯 🖬 💁 🖙 🗠 🔍 ()	Ó	↑ »
Object Browser × Solution Solution		

The [Solver Console [Nays2D Flood] (running)] window will open to start the simulation.

2.0	3 into - iRIC v/ 4.0.0.6884 [Nav	2D Flood v5.0.6	bitl - ISolver Cor	sole (Nave	2D Elooc	UV5 0 64 F	itl (nun	ning)]							- F	1 ×
Fil	e Import Calculation Condit	ion Simulation	Calculation Resu	lt View	Option	Help	ng (run	ning/]								- 8 ×
		$\sim \sim 0$	$\overset{\text{tr}_{X}}{\sqsubseteq}\overset{\text{tr}_{0}}{\longrightarrow}\mid Y_{X}$	Z _Y Z _X	< ⊢	$\rightarrow \uparrow$	\downarrow	⊕ ⊝		🦯	· 2D 2	D 3D	<u>~</u> (<u>`</u> , (C	L C	5 6	
2	Nays2d_flood Solver Copyright(C) by Yas Modified by Ichiro	Version 5.0 uyuki Shimiz Kimura, Tosh	.0000 Last u u, Hokkaido iki Iwasaki,	updated Univ., Satomi	2014/ Japan Kawar	5/14 nura, T	akuya	a Inoue	, Mic							
3	0	1	34	36												
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4. Visualization of computational results

1 Open the 2D Post-processing window

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On the menu bar, click [Open New 2D Post-Processing Window] icon

The [Post-processing Window (2D)] will open.

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2 Visualizing the water depth

In the Object Browser, select [Nays2D Flood Grids] - [iRICZone] - [Scalar] - [Depth] by making a check mark in each box.

A contour map of water depth will open.



In the Object Browser, select [Nays2D Flood Grids] - [iRICZone] - [Scalar]. Right click on [Depth] to select [Property].

The [Scalar Setting] window will open.



On the [Scalar Setting] window, make the following settings and click on [OK]:

The contour map is easier to see now.



3 Visualizing flow vector

In the Object Browser, select [Nays2D Flood Grids] - [iRICZone] - [Arrow] - [Velocity]. In the Object Browser, select [Nays2D Food Grids] - [iRICZone] - [Arrow]. Right click on [Arrow] to select [Property].

The [Contour Setting] window will open.



On the [Contour Setting] window, make the following settings and click on [OK]:

alue: Velocity(ms=1) ~	Length Legend
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Length

Remove ☑ from [Auto]

Standard value: 8.00

Length on screen: 40

Minimum value to draw: 0.008

Sampling:

Sampling rate (Idirection): 2

Sampling rate (Jdirection): 2

Color:

Do not change any settings.

4 Visualizing animated changes

On the menu bar, Click [restart]

On the menu bar, Click [)

Animated changes in inundation depth and flow vector will be displayed.



To Reader

• Please reference the iRIC software, if you publish a paper with

results from the iRIC software.

• The datasets provided at the Web site are sample data. Therefore you

can use it for a test computation.

• Let us know your suggestions, comments and concerns at

http://i-ric.org.

i? iRIC Software

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Supported by River center of Hokkaido, Japan.

Co-sponsored:

Chinese Institute of Civil and Hydraulic Engineering **Sustainable Development Committee**

Co-organizing: Dept. of Bioenvironmental Systems Engineering, NTU Dept. of Civil Engineering, NTU Dept. of Civil Engineering, NCHU Sinotech Engineering Consultants, Inc.