Introduction to Modeling River Flow and Morphodynamics within the IRIC Interface: April 1-2, 2017, Feng Chia University, Taichung, Taiwan.

This class covers a broad spectrum of river modeling techniques within the International River Interface Cooperative (IRIC) public-domain modeling interface. The course will be taught in a workshop format starting with basic data input and stepping through the processes of grid generation, model execution, visualization, and verification. The interface incorporates a variety of computational modeling approaches including finite difference and finite volume models using both structured and unstructured coordinate systems; only a subset of the available techniques will be covered in this short class. Basic principles will be briefly covered, but the emphasis of this short course is hands-on application using data sets for realistic problems on real rivers and hill slopes. For the class in Taichung, the students will learn and use the following:

-FaSTMECH: Quasi-steady, two and quasi- three-dimensional model for river flow with morphodynamics. Useful for long river reaches where high grid resolution is required for water-surface elevations and velocities, flood predictions, and bed morphology changes.

-Nays1D+: One dimensional solver for river flows and river morpho-dynamics. Steady non-uniform flow model and unsteady flow model are selectable. The non-uniform flow model is much more computationally efficient and is applicable for long tern computation. Unsteady flow model can consider rapid change of flows under steep hydrograph.

-Nays2DH: Fully unsteady, two-dimensional model for river flow and morphodynamics incorporating sophisticated turbulence treatments and advection schemes to ensure good treatment of unsteadiness effects. Useful for a wide spectrum of river problems including bed response to structures, bar evolution, spatial grain size sorting, and bank erosion.

Students can use the PCs in the lecture room, in which iRIC software has already been installed. Bing data sets with topography, water-surface elevations, and any other data if you would like some assistance with your own projects. The class will be taught by Jonathan Nelson from USGS with their collaborators Ichiro Kimura from Hokkaido University, Japan and Kazutake Asahi from River Link Co. Ltd, Tokyo, Japan. All software is freely available.

Class Schedule

Saturday, April 1

9:00	Introduction to the iRIC interface and solvers with iRIC demonstration
10:15	Data requirements and importing data (FaSTMECH(2D steady solver) Tutorial 1, Exercise 1)
10:45	Break
11:00	Generating simple grids and mapping data on to them (FaSTMECH Tutorial 1, Exercise 2)
12:00	Description of FaSTMECH 2d and 3d
12:30	Lunch Break
2:00	Running solvers and visualizing results (FaSTMECH Tutorial 1, Exercise 3, Tutorial 2)
3:30	Break
3:45	Special lecture by Professor Yasuyuki Shimizu on “Typhoon disaster in Hokkaido in 2016 and its clarifications with iRIC”
5:00	End

Sunday, April 2

9:00	Description of Nays1D+(1D unsteady solver) approximations and methods
9:15	Tutorial on Unsteady flow simulation with Nays1D+ (Part 1)
10:45	Break
11:00	Tutorial on Unsteady flow simulation with Nays1D+ (Part 2)
12:00	Lunch Break
13:30	Description of Nays2DH (2D unsteady solver) approximations and method
13:45	Flow simulation for a simple channel with structures (Nays2DH Tutorial 1)
14:45	Break
15:00	Calculation of morphologic change in a simple meander bend (Nay2DH Tutorial 2) Flow and morphodynamics in a real river (Nays2DH Tutorial 3)
17:00	End