E-NEWS

2008/2 - SPECIAL EXTEND NEWS

TABLE OF CONTENTS

1. EXTEND USER FORUM

FAQs on SPICOSA's Extend user forum

Cluster meetings showed that half of the study sites had already started formulating models in Extend. People with questions may want to have a look at the Extend forum on www.spicosa.org. Log in on the site and surf to forum to join the discussions.

An interesting question about **data types** of numbers entered the forum. As in traditional programming languages, numbers in Extend are also typed either as "integer" and "long" (1, 2, …), or as "real" and "double" (for instance 1.24). But what happens if you enter the following expression in an equation box: $OutCon0 = InCon0 * (1/2)$? Ben Tomlinson, SSA12, found out that this returns zero, in stead of the expected half of the input value. In contrast, the equation $OutCon0 = InCon0*0.5$ works fine, he noted.

In the fraction 1/2 Extend considers both 1 and 2 as integers and rounds off to 0, also an integer. You can tell Extend to consider numbers as real data types by rewriting the equation: $OutCon0 = InCon0 * (1./2.)$. So by entering a point after a number, Extend will treat this number as a real value. The result of 1./2. is indeed 0.5.

2. HOW STUFF WORKS IN EXTENDSIM

Integrator or tank block? Which one to use for modelling?

In essence, there is no mathematical difference between the two blocks. Both offer the choice to integrate your input over time using a forward (delay) and backward (no delay) Euler integration routine. The number of connectors, however, does differ. The integrator block has only one input connector; the holding tank has several connectors. Sources increasing the contents of the holding tank enter the tank via the input connector on the left-hand site. Sinks decreasing the tank contents leave the holding tank block via the want connector. To do the same when using an integrator block, you need to subtract sinks from sources and send the difference to the input connector of the integrator block for integration.

What is Euler integration? In math class, we all learnt how to integrate a simple function using pen and paper. Pen, paper and even a good set of brains won't help you anymore if you need to solve a set of coupled differential equations. Then, numerical integration provides an alternative. Forward Euler integration is such a numerical method and it is also available in the integrator block and the holding tank (choose delay). This method requires a sufficiently small time step. Thus, whenever you integrate in Extend, it is worthwhile setting the time step to a value less than 1, for instance 0.1 or 0.01. If not, results may look odd and your output tends to explode to infinity. This often happens if your model contains rates and parameters with different orders of magnitude. Setting the time step can be done under the menu Run. Click on simulation setup. Choose the tab Continuous and alter the time step (dt) to a small value.

3. NEWS FROM WP8 (MODEL SUPPORT)

The simple NPZ model for estuarine systems is available on the ftp site

During the cluster meetings, a simple model simulating the dynamics of nitrogen, phytoplankton and zooplankton was presented. This Extend model is an example of how to implement a set of coupled differential equations in Extend. The model was published in Estuarine Coastal and Shelf Science. Both paper and Extend model can be downloaded from the ftp site. Look under:
ftp://eftp.ifremer.fr/wp/WP8/Extend/Training_Material/
and copy the zip file to your local drive.
Under this folder, you will find other tutorial models as well.

COLOPHON

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