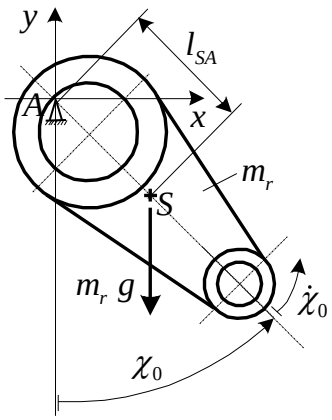
GÉPEK DINAMIKÁJA 3.gyak.hét – 1. Feladat

(kidolgozta: Dr. Nagy Zoltán egyetemi adjunktus)

HAJTÓRÚD – FIZIKAI INGA



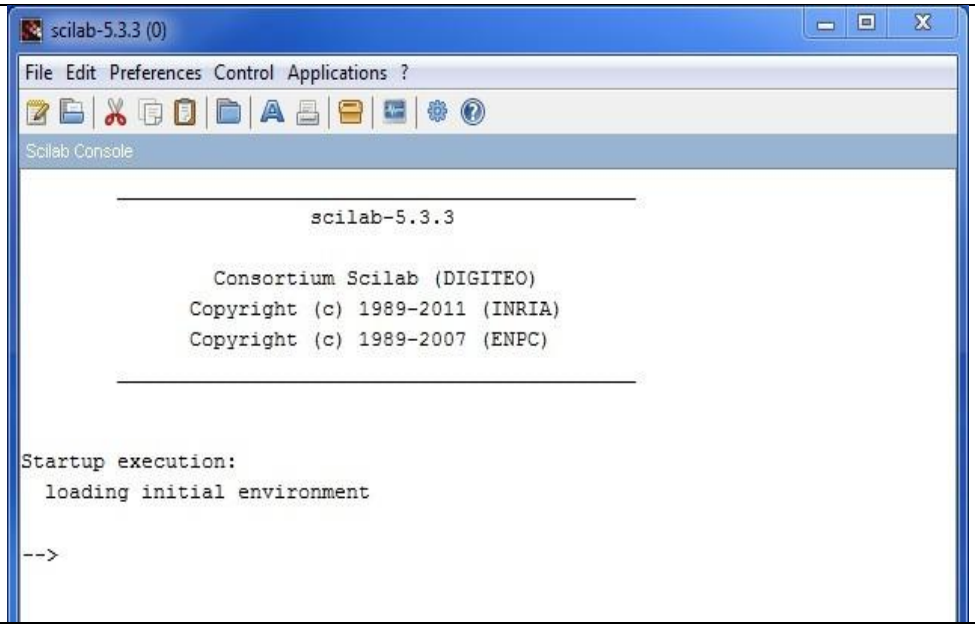
$$J_{AZ}\,\ddot{\chi} = -l_{SA}\,m_r\,g\,\sin\chi\,,$$

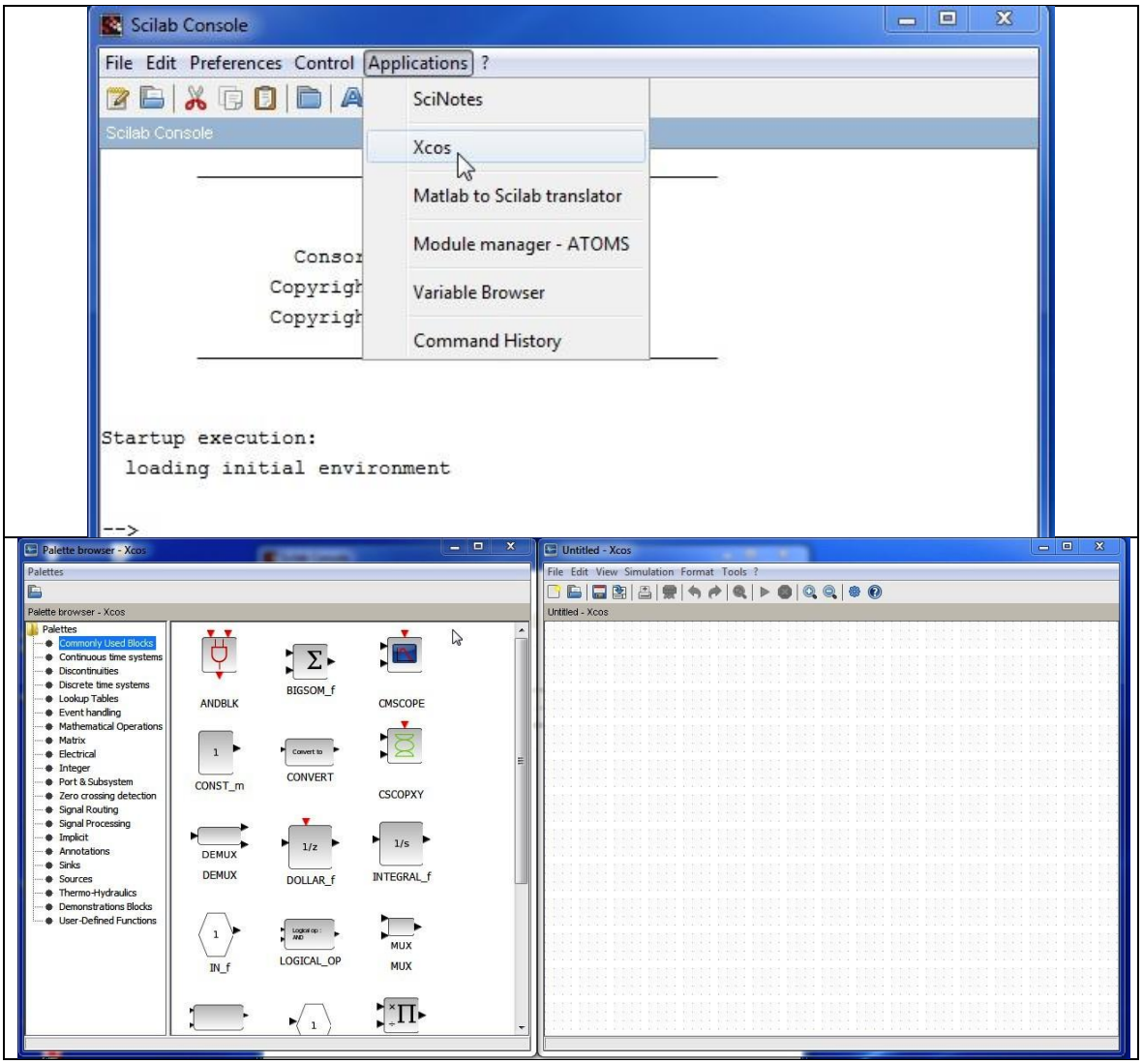
$$\ddot{\chi} = -\frac{l_{SA}\,m_r\,g}{J_{AZ}}\sin\chi \quad (rad/s^2) \quad \text{szöggyorsulás.}$$

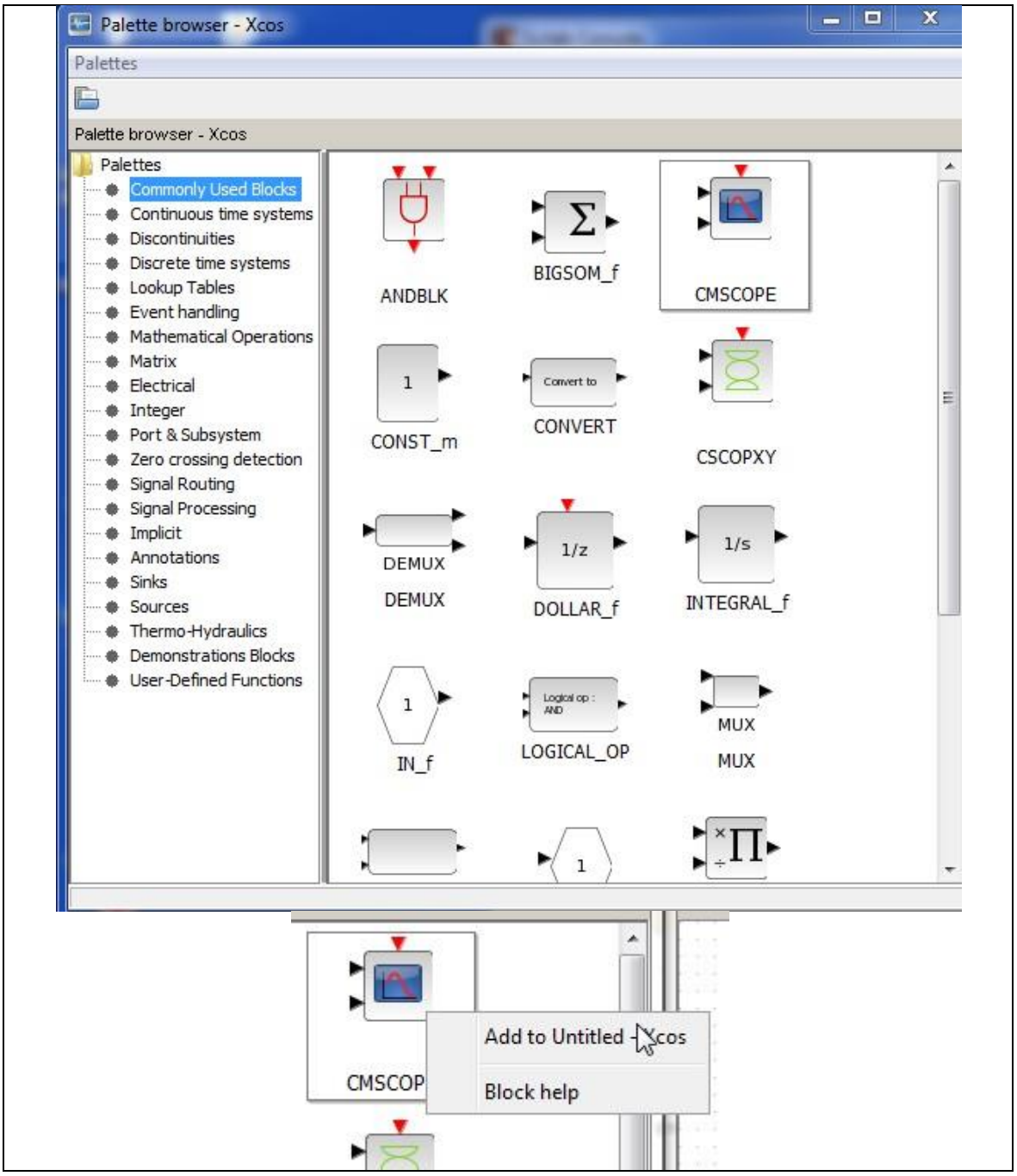
$$l_{SA} = 0{,}15\ m \quad , \quad J_{AZ} = 0{,}05\ kgm^2,$$

$$m_r = 0{,}45\ kg\ , \quad g = 10\ m/s^2\ .$$

$$Kezdeti\ \ feltételek: \chi_0 = 0{,}3\ rad\ ,\ \dot{\chi}_0 = 0{,}5\ rad/s.$$




Scilab Console
File Edit Preferences Control Applications ?
SciNotes
Xcos
Matlab to Scilab translator
Module manager - ATOMS
Variable Browser
Command History
Startup execution:
loading initial environment
-->
Palette browser - Xcos
Palettes
Commonly Used Blocks
Continuous time systems
Discontinuities
Discrete time systems
Lookup Tables
Event handling
Mathematical Operations
Matrix
Electrical
Integer
Port & Subsystem
Zero crossing detection
Signal Routing
Signal Processing
Implicit
Annotations
Sinks
Sources
Thermo-Hydraulics
Demonstrations Blocks
User-Defined Functions
ANDBLK
BIGSOM_f
CMSCOPE
CONST_m
CONVERT
CSCOPXY
DEMUX
DOLLAR_f
INTEGRAL_f
IN_f
LOGICAL_OP
MUX
Untitled - Xcos
File Edit View Simulation Format Tools ?


Palette browser - Xcos
Palettes
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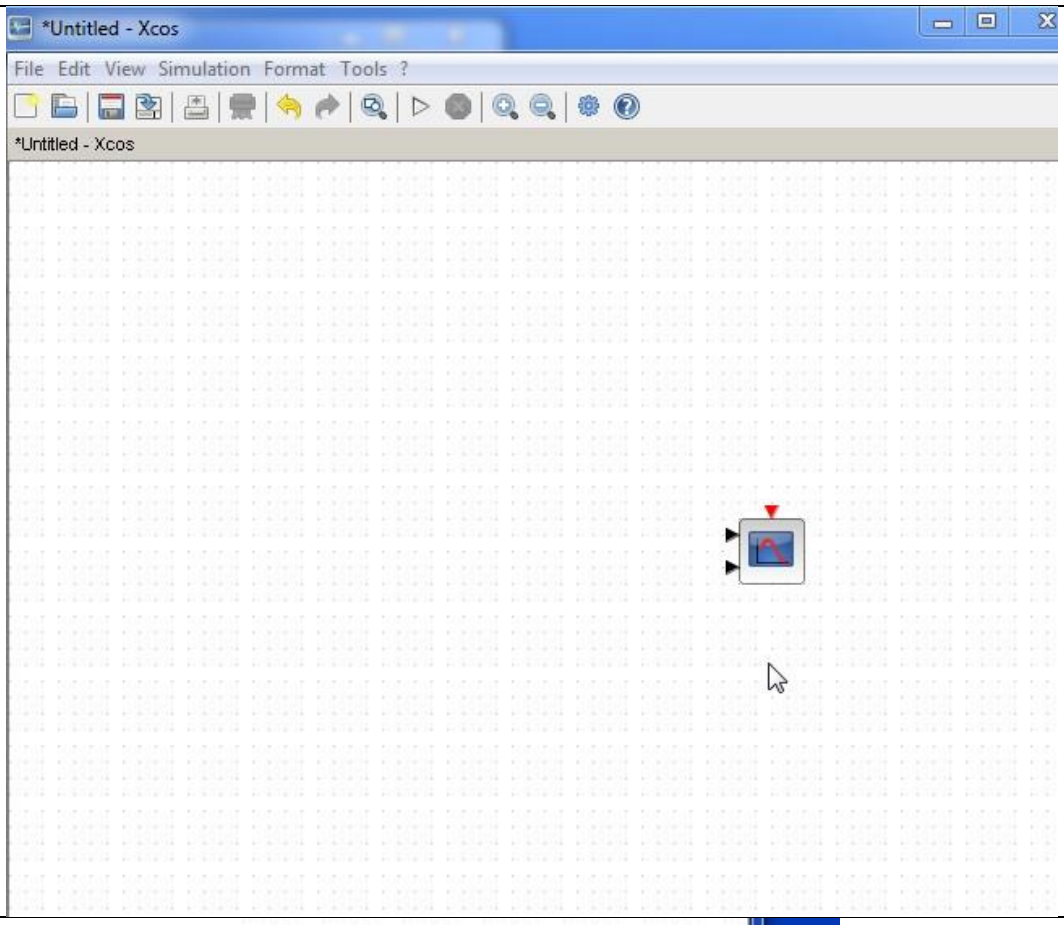
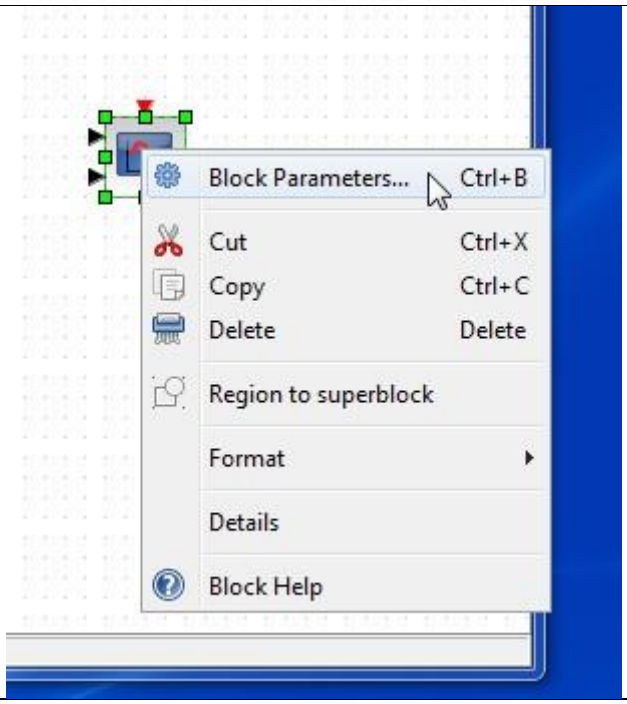
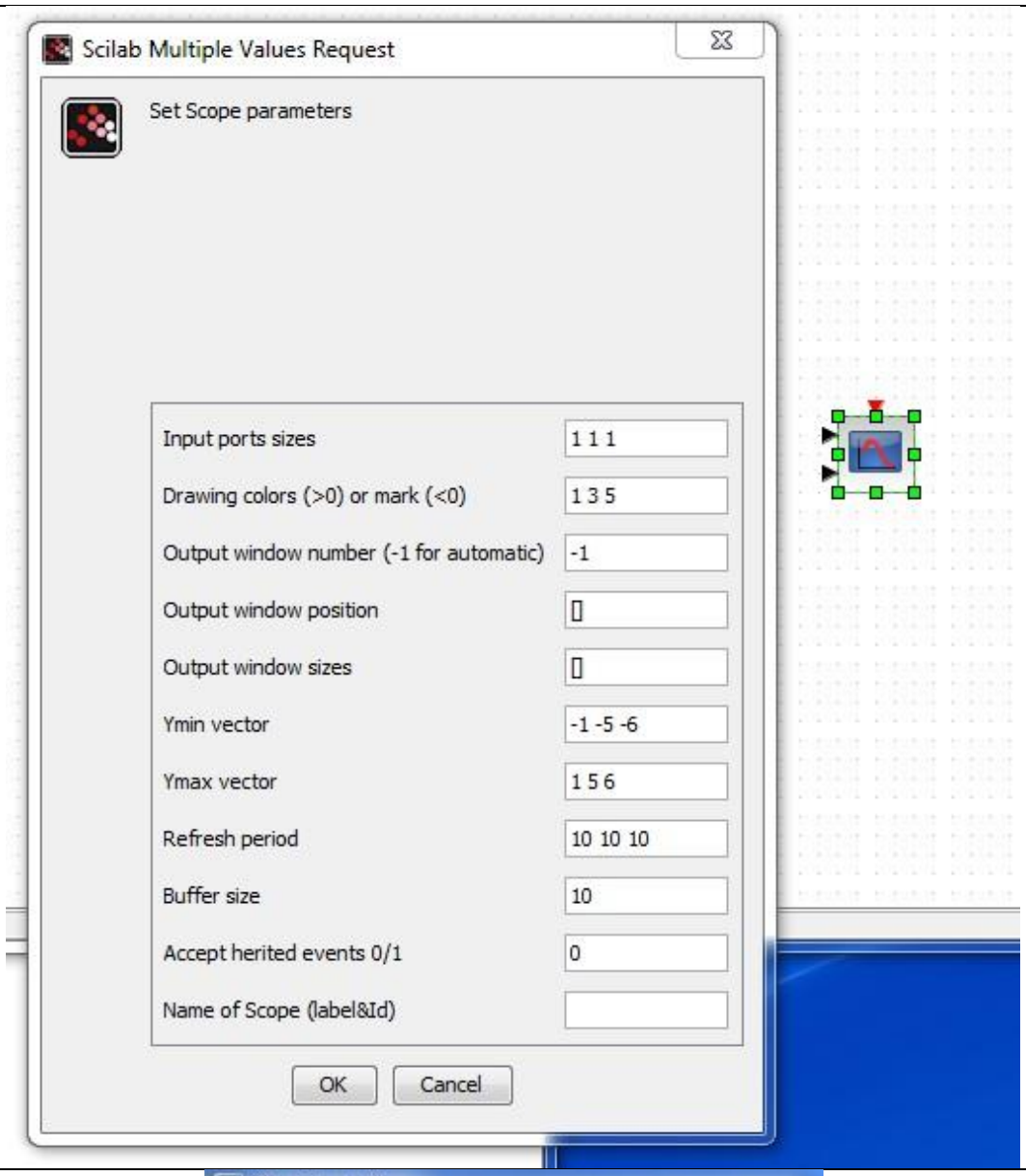
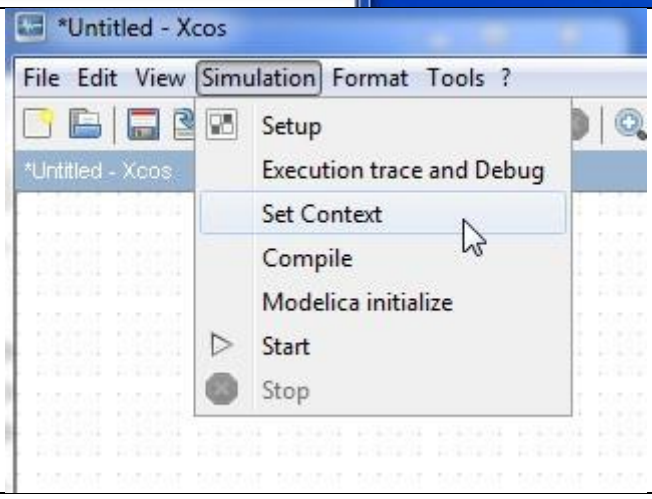
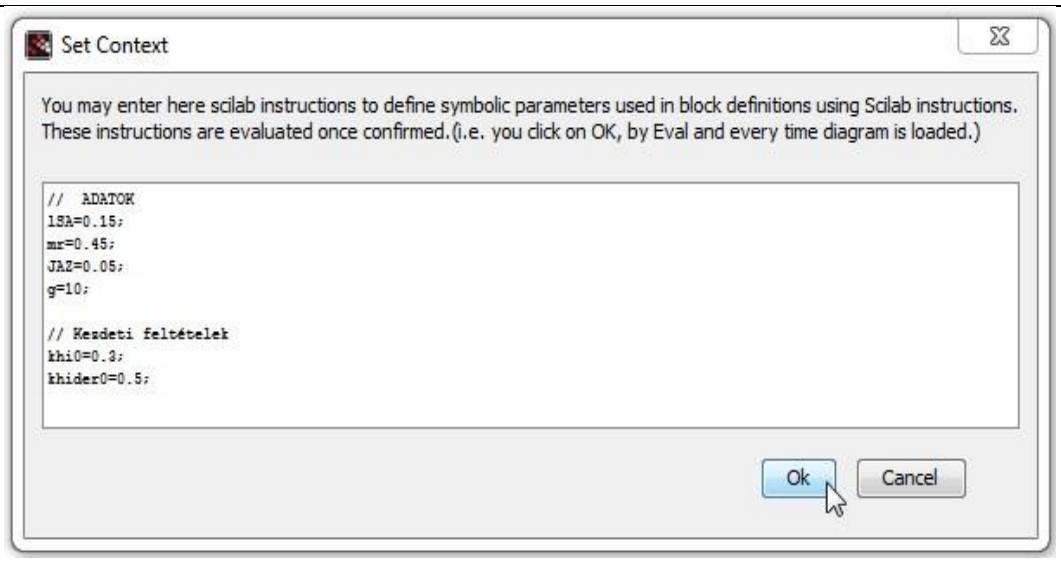
DEMUX
DEMUX
DOLLAR_f
INTEGRAL_f
IN_f
LOGICAL_OP
MUX
MUX
CMSCOP
Add to Untitled - Xcos
Block help

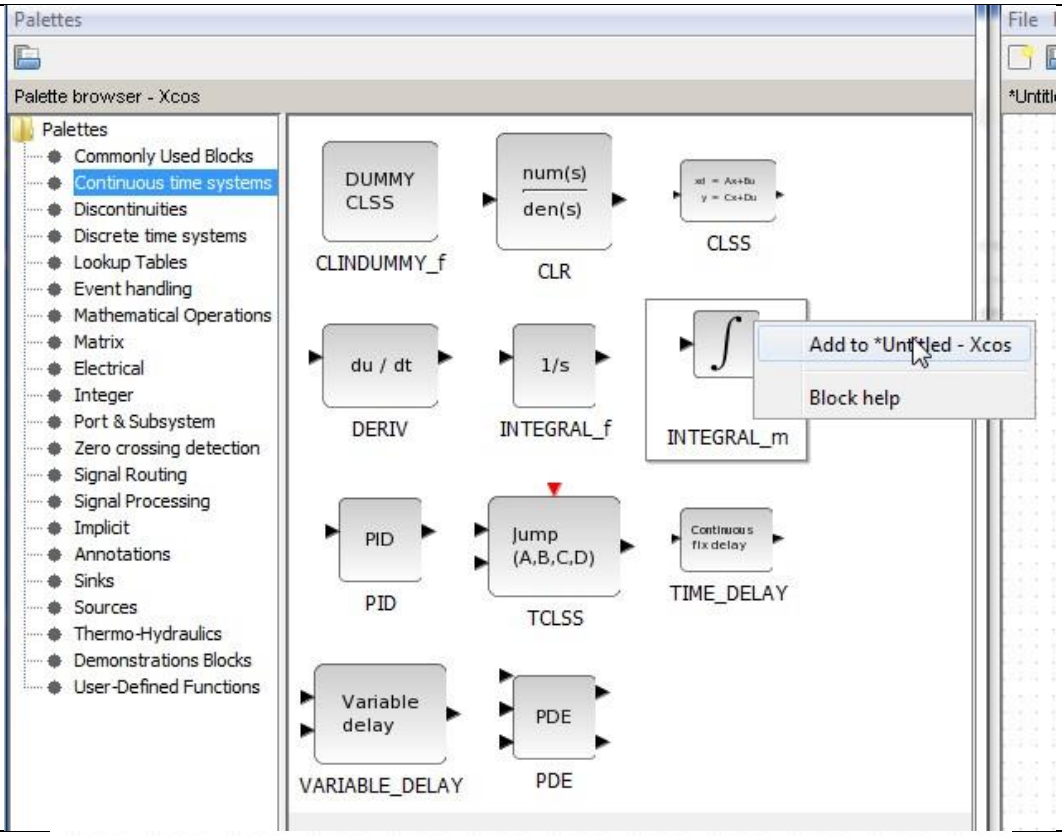

*Untitled - Xcos
File Edit View Simulation Format Tools ?
*Untitled - Xcos


Block Parameters... Ctrl+B
Cut Ctrl+X
Copy Ctrl+C
Delete Delete
Region to superblock
Format
Details
Block Help


Scilab Multiple Values Request
Set Scope parameters
Input ports sizes
1 1 1
Drawing colors (>0) or mark (<0)
1 3 5
Output window number (-1 for automatic)
-1
Output window position
[]
Output window sizes
[]
Ymin vector
-1 -5 -6
Ymax vector
1 5 6
Refresh period
10 10 10
Buffer size
10
Accept herited events 0/1
0
Name of Scope (label&Id)
OK
Cancel


*Untitled - Xcos
File Edit View Simulation Format Tools ?
Setup
Execution trace and Debug
Set Context
Compile
Modelica initialize
Start
Stop


Set Context
You may enter here scilab instructions to define symbolic parameters used in block definitions using Scilab instructions.
These instructions are evaluated once confirmed.(i.e. you click on OK, by Eval and every time diagram is loaded.)
// ADATOK
lSA=0.15;
mr=0.45;
JAZ=0.05;
g=10;
// Kezdeti feltételek
khi0=0.3;
khider0=0.5;
Ok
Cancel


Palettes
Palette browser - Xcos
Palettes
Commonly Used Blocks
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Discontinuities
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Signal Processing
Implicit
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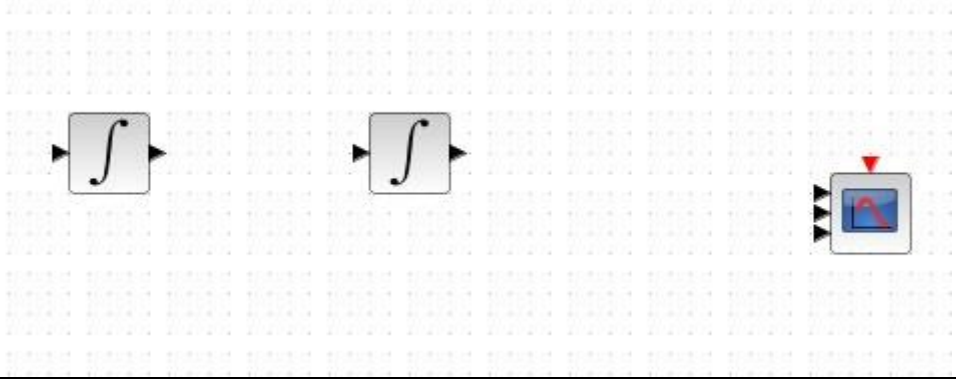
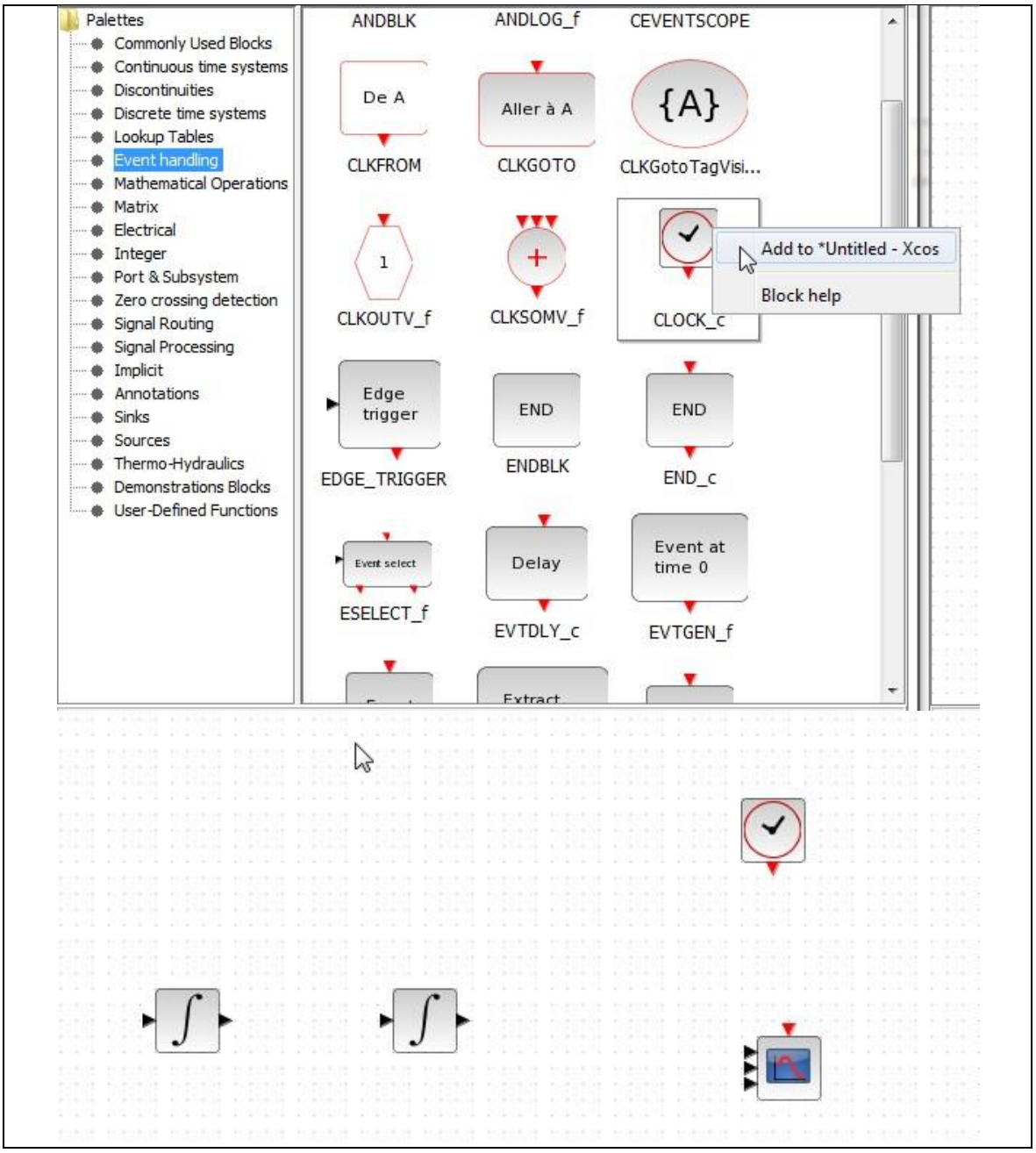
Sources
Thermo-Hydraulics
Demonstrations Blocks
User-Defined Functions
DUMMY CLSS
CLINDUMMY_f
num(s)
den(s)
CLR
CLSS
du / dt
DERIV
1/s
INTEGRAL_f
INTEGRAL_m
Add to *Untitled - Xcos
Block help
PID
PID
Jump (A,B,C,D)
TCLSS
Continuous fix delay
TIME_DELAY
Variable delay
VARIABLE_DELAY
PDE
PDE




Palettes
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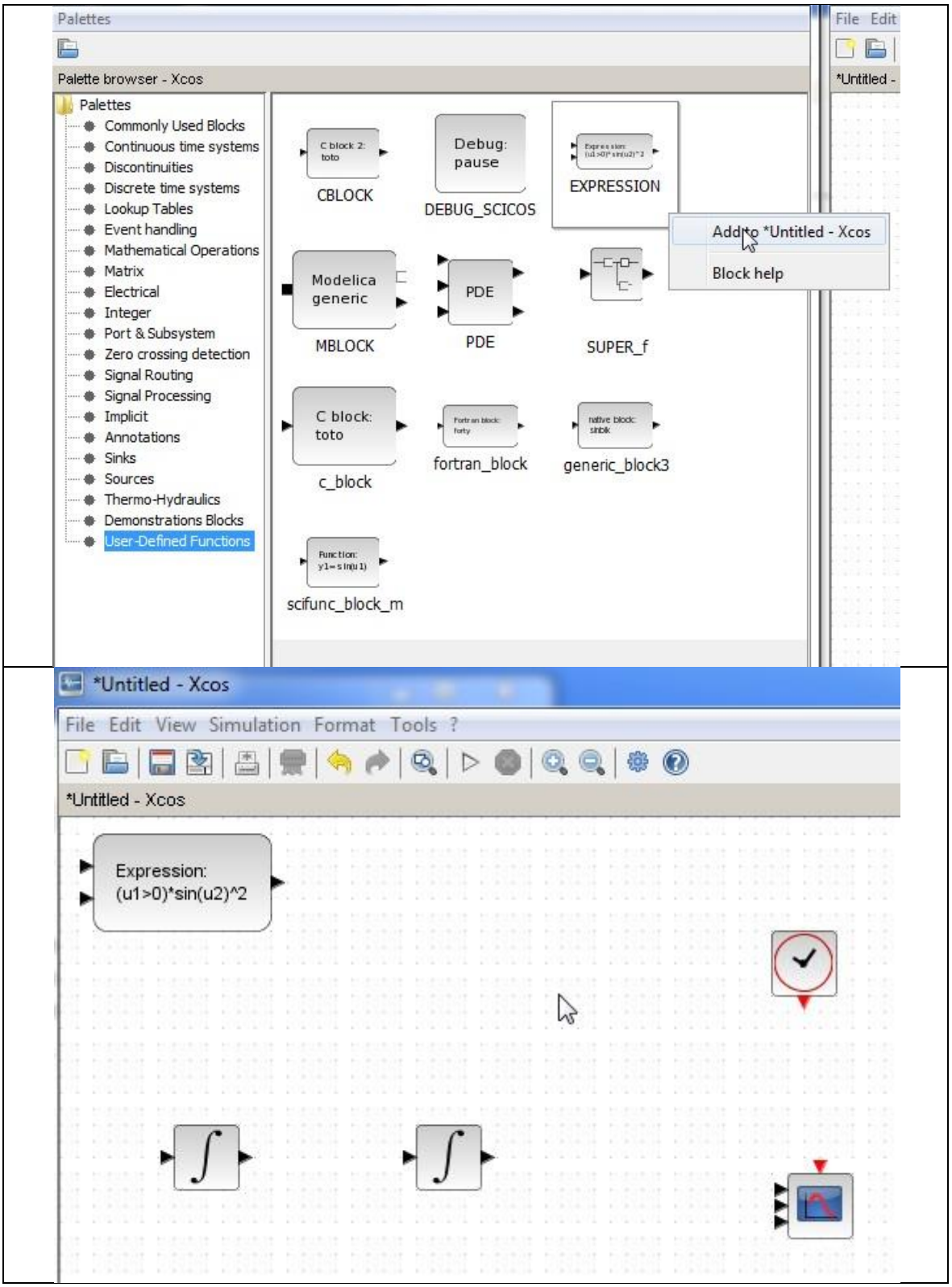
Thermo-Hydraulics
Demonstrations Blocks
User-Defined Functions
ANDBLK
ANDLOG_f
CEVENTSCOPE
De A
CLKFROM
Aller à A
CLKGOTO
{A}
CLKGotoTagVisi...
1
CLKOUTV_f
CLKSOMV_f
CLOCK_c
Add to *Untitled - Xcos
Block help
Edge trigger
EDGE_TRIGGER
END
ENDBLK
END
END_c
Event select
ESELECT_f
Delay
EVTDLY_c
Event at time 0
EVTGEN_f


Palettes
Palette browser - Xcos
Palettes
Commonly Used Blocks
Continuous time systems
Discontinuities
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Event handling
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Matrix
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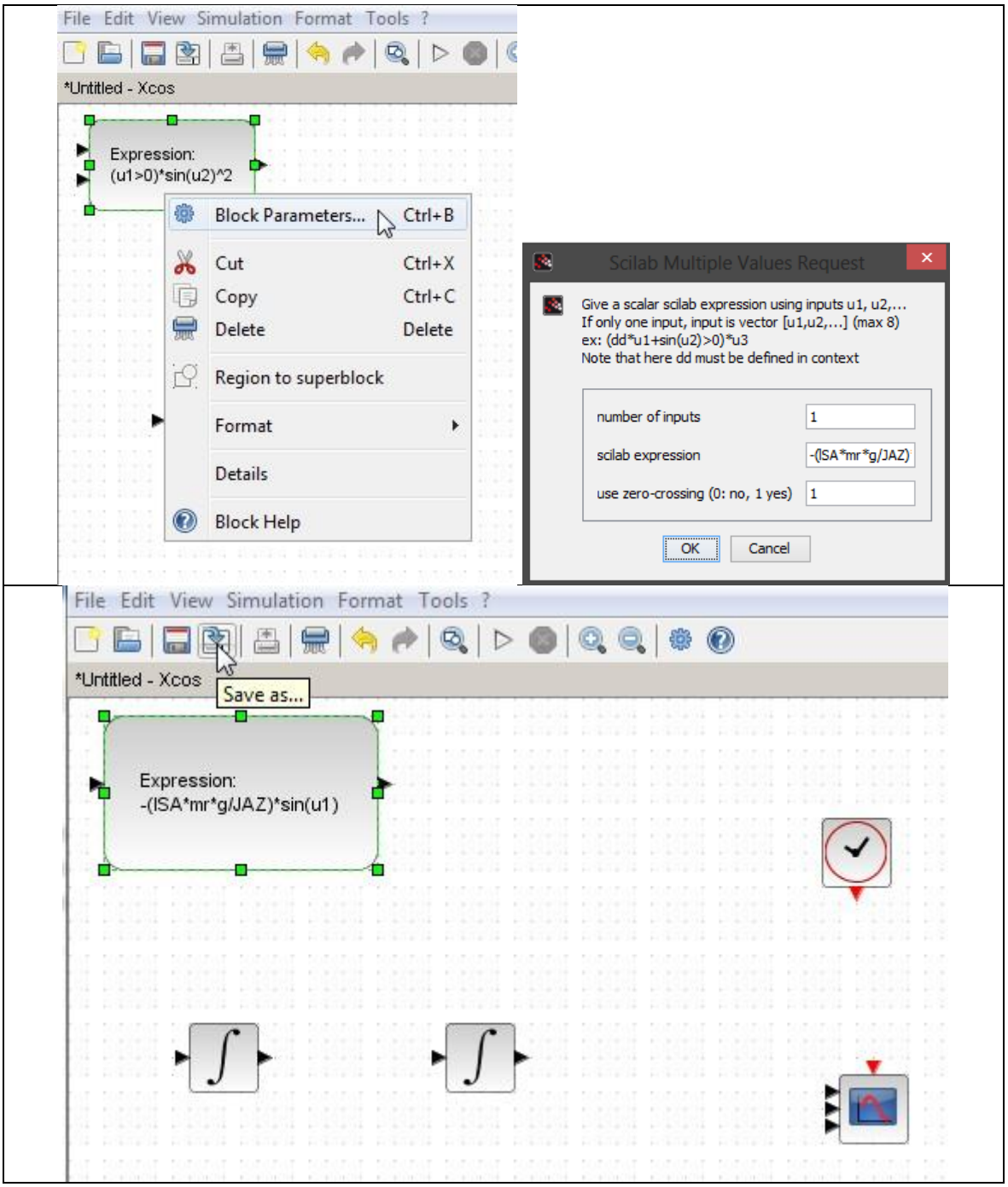
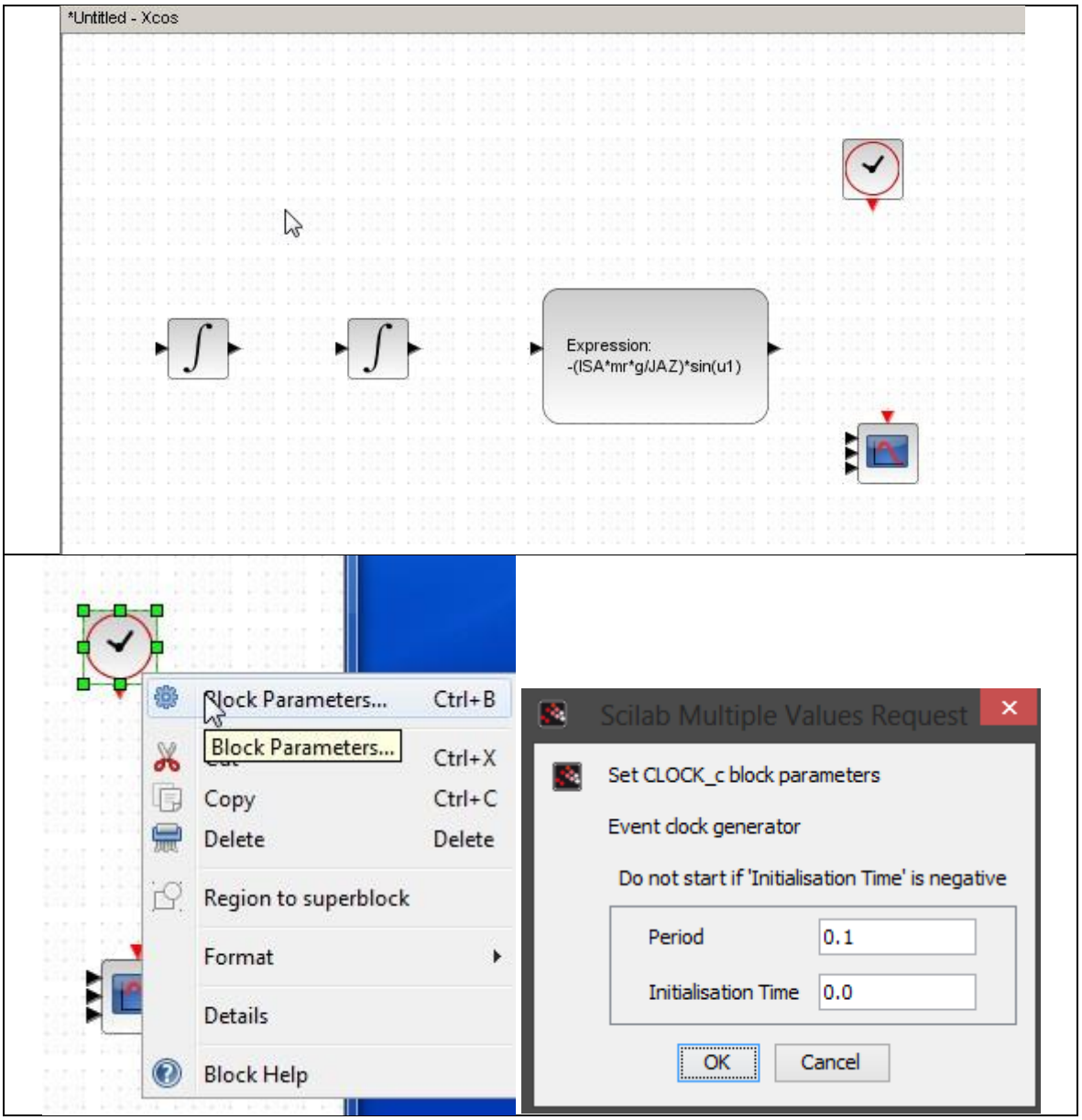
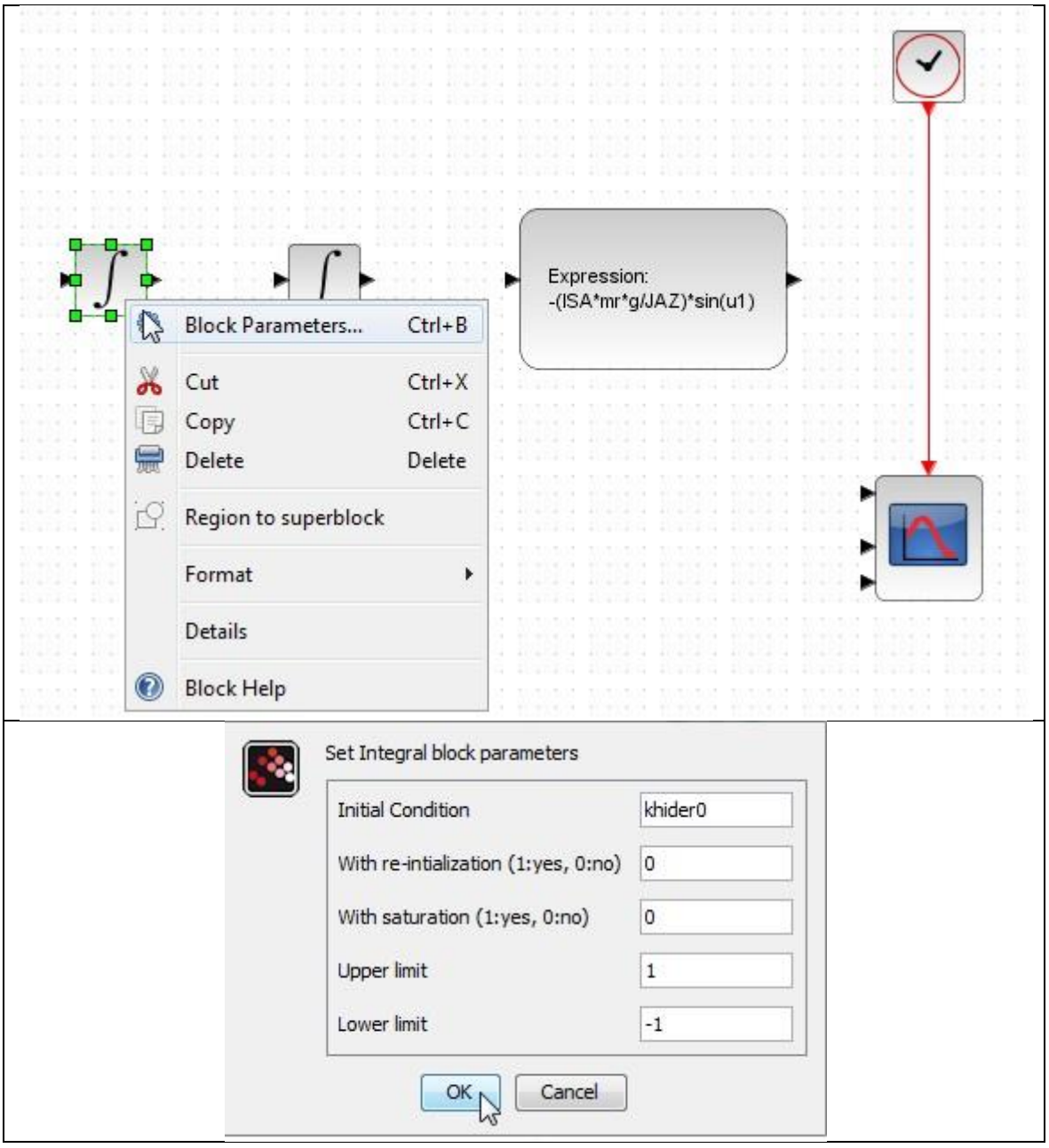
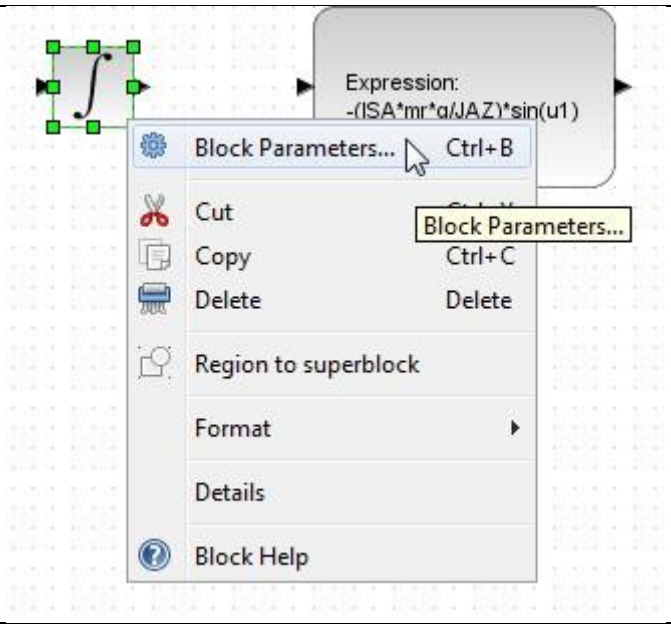
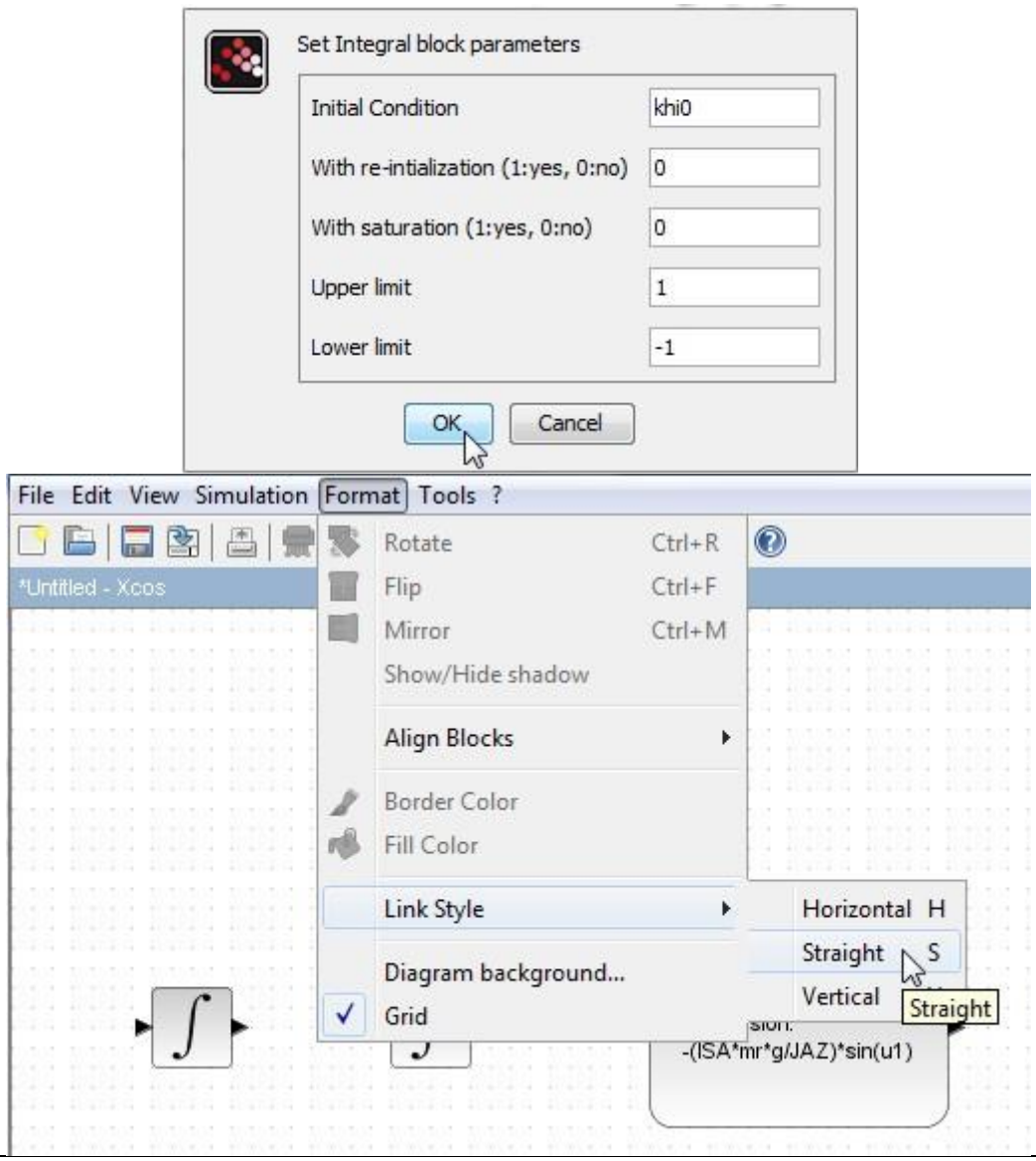
Implicit
Annotations
Sinks
Sources
Thermo-Hydraulics
Demonstrations Blocks
User-Defined Functions
CBLOCK
Debug: pause
DEBUG_SCICOS
EXPRESSION
Add to *Untitled - Xcos
Block help
Modelica generic
MBLOCK
PDE
PDE
SUPER_f
C block: toto
c_block
fortran_block
generic_block3
scifunc_block_m
File Edit
*Untitled -
*Untitled - Xcos
File Edit View Simulation Format Tools ?
*Untitled - Xcos
Expression: (u1>0)*sin(u2)^2

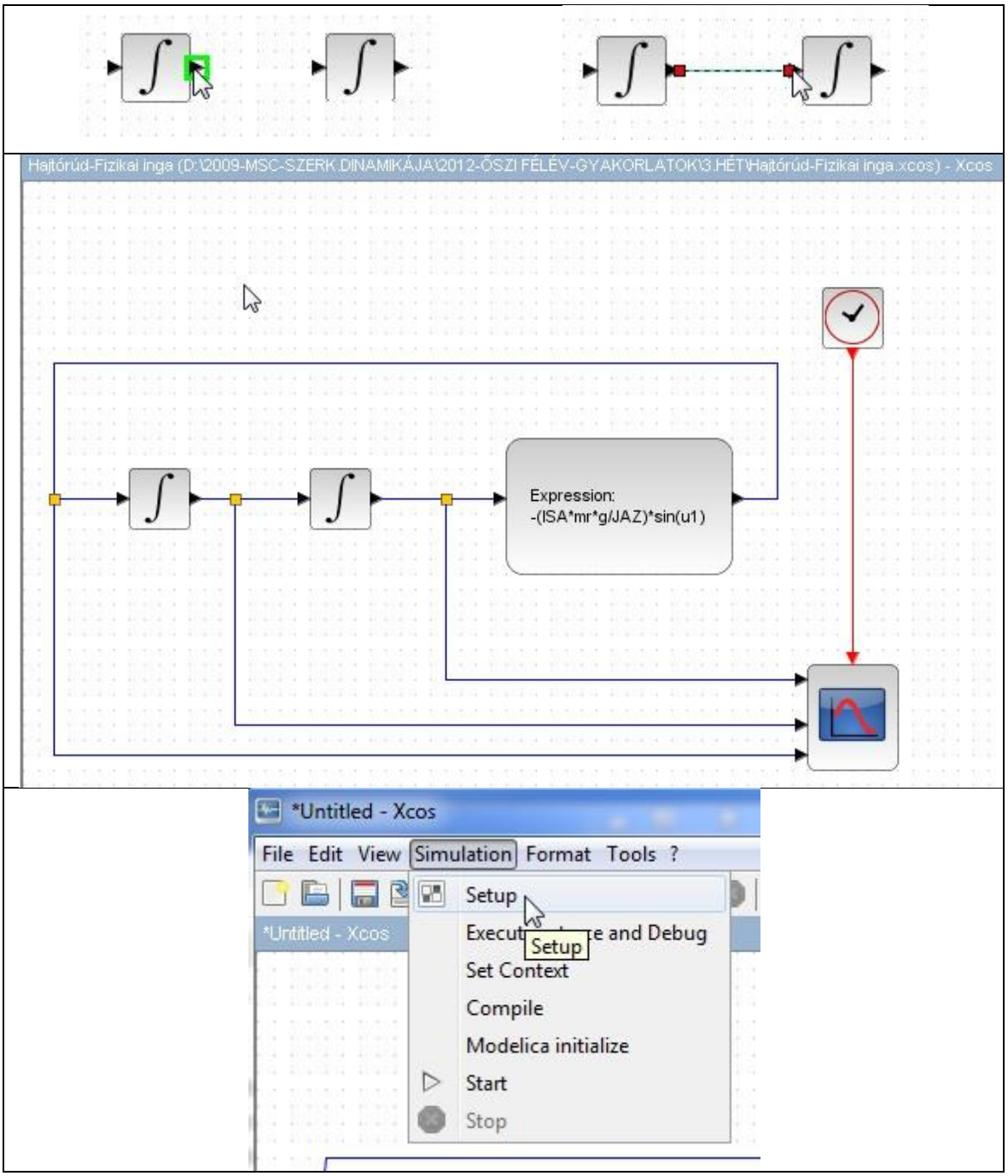

File Edit View Simulation Format Tools ?
*Untitled - Xcos
Expression:
(u1>0)*sin(u2)^2
Block Parameters... Ctrl+B
Cut Ctrl+X
Copy Ctrl+C
Delete Delete
Region to superblock
Format
Details
Block Help
Scilab Multiple Values Request
Give a scalar scilab expression using inputs u1, u2,...
If only one input, input is vector [u1,u2,...] (max 8)
ex: (dd*u1+sin(u2)>0)*u3
Note that here dd must be defined in context
number of inputs 1
scilab expression -(ISA*mr*g/JAZ)
use zero-crossing (0: no, 1 yes) 1
OK
Cancel
File Edit View Simulation Format Tools ?
*Untitled - Xcos
Save as...
Expression:
-(ISA*mr*g/JAZ)*sin(u1)

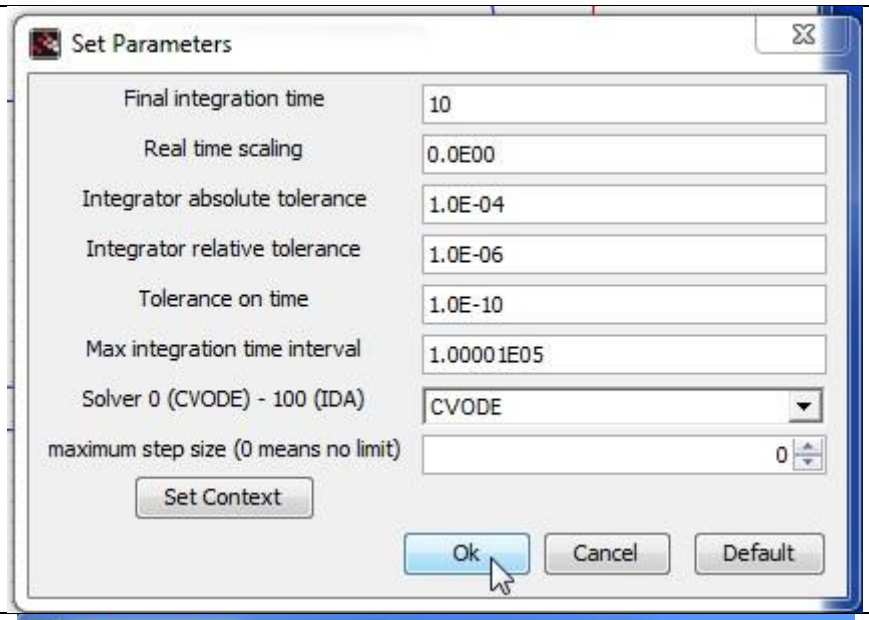

*Untitled - Xcos
Expression:
-(lSA*mr*g/JAZ)*sin(u1)
Block Parameters... Ctrl+B
Block Parameters...
Ctrl+X
Copy Ctrl+C
Delete Delete
Region to superblock
Format
Details
Block Help
Scilab Multiple Values Request
Set CLOCK_c block parameters
Event clock generator
Do not start if 'Initialisation Time' is negative
Period 0.1
Initialisation Time 0.0
OK
Cancel

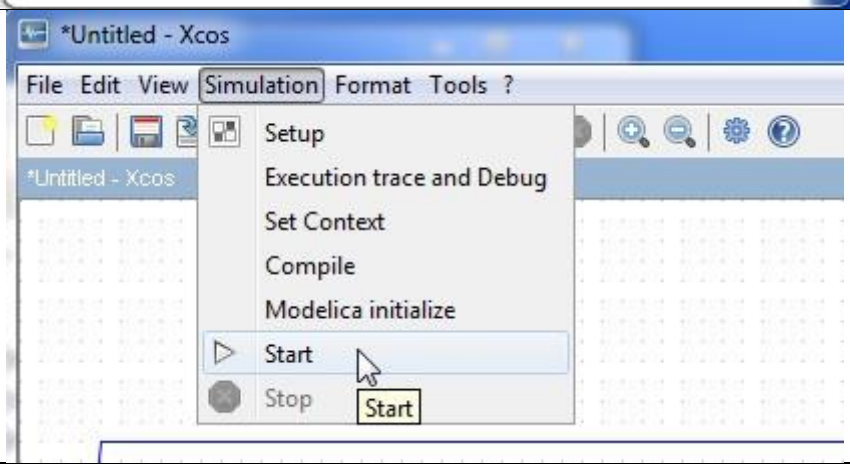

Block Parameters... Ctrl+B
Cut Ctrl+X
Copy Ctrl+C
Delete Delete
Region to superblock
Format
Details
Block Help
Expression:
-(lSA*mr*g/JAZ)*sin(u1)
Set Integral block parameters
Initial Condition
khider0
With re-intialization (1:yes, 0:no)
0
With saturation (1:yes, 0:no)
0
Upper limit
1
Lower limit
-1
OK
Cancel

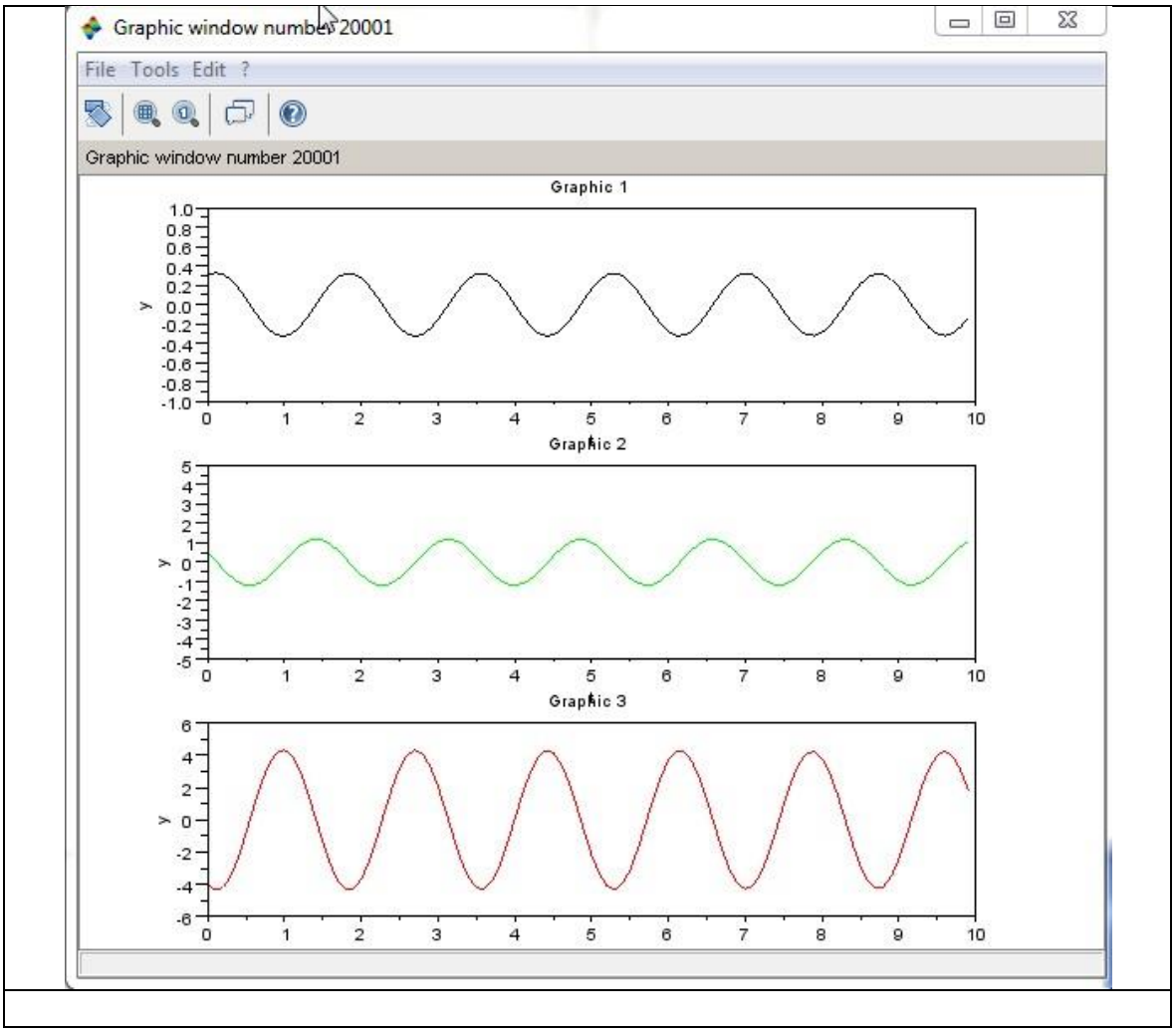

Expression:
-(ISA*mr*g/JAZ)*sin(u1)
Block Parameters... Ctrl+B
Cut
Copy Ctrl+C
Delete Delete
Region to superblock
Format
Details
Block Help
Block Parameters...


Set Integral block parameters
Initial Condition khi0
With re-intialization (1:yes, 0:no) 0
With saturation (1:yes, 0:no) 0
Upper limit 1
Lower limit -1
OK
Cancel
File Edit View Simulation Format Tools ?
*Untitled - Xcos
Rotate Ctrl+R
Flip Ctrl+F
Mirror Ctrl+M
Show/Hide shadow
Align Blocks
Border Color
Fill Color
Link Style
Diagram background...
Grid
Horizontal H
Straight S
Vertical
Straight
-(ISA*mr*g/JAZ)*sin(u1)


Hajtórúd-Fizikai inga (D:\2009-MSC-SZERK.DINAMIKÁJA\2012-ŐSZI FÉLÉV-GYAKORLATOK\3.HÉT\Hajtórúd-Fizikai inga.xcos) - Xcos
Expression:
-(lSA*mr*g/JAZ)*sin(u1)
*Untitled - Xcos
File Edit View Simulation Format Tools ?
Setup
Execute and Debug
Set Context
Compile
Modelica initialize
Start
Stop


Set Parameters
Final integration time
10
Real time scaling
0.0E00
Integrator absolute tolerance
1.0E-04
Integrator relative tolerance
1.0E-06
Tolerance on time
1.0E-10
Max integration time interval
1.00001E05
Solver 0 (CVODE) - 100 (IDA)
CVODE
maximum step size (0 means no limit)
0
Set Context
Ok
Cancel
Default


*Untitled - Xcos
File Edit View Simulation Format Tools ?
*Untitled - Xcos
Setup
Execution trace and Debug
Set Context
Compile
Modelica initialize
Start
Stop
Start


Graphic window number 20001
File Tools Edit ?
Graphic window number 20001
Graphic 1
Graphic 2
Graphic 3
y