

MathWorks | Global Product
Development Conference
Italy

21 Ottobre 2008 » Centro Ricerche FIAT

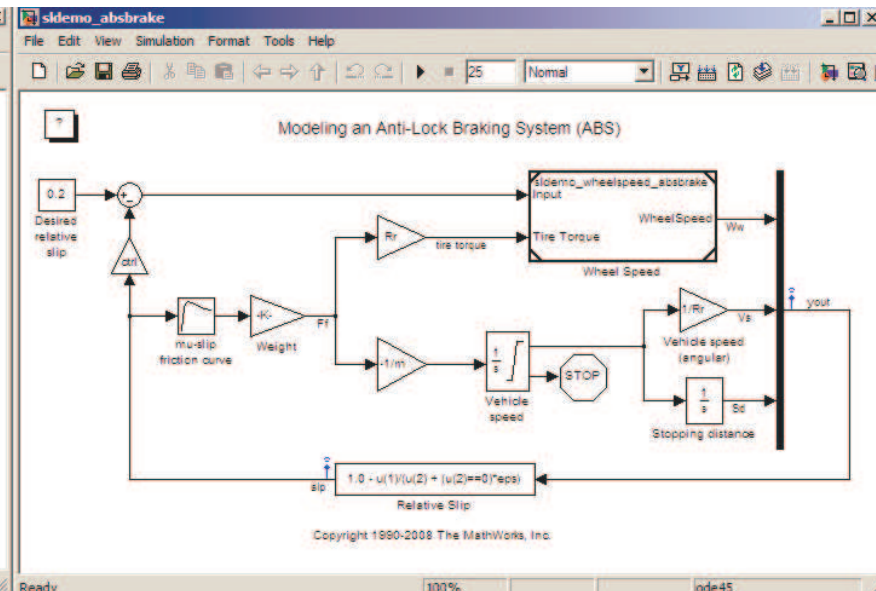
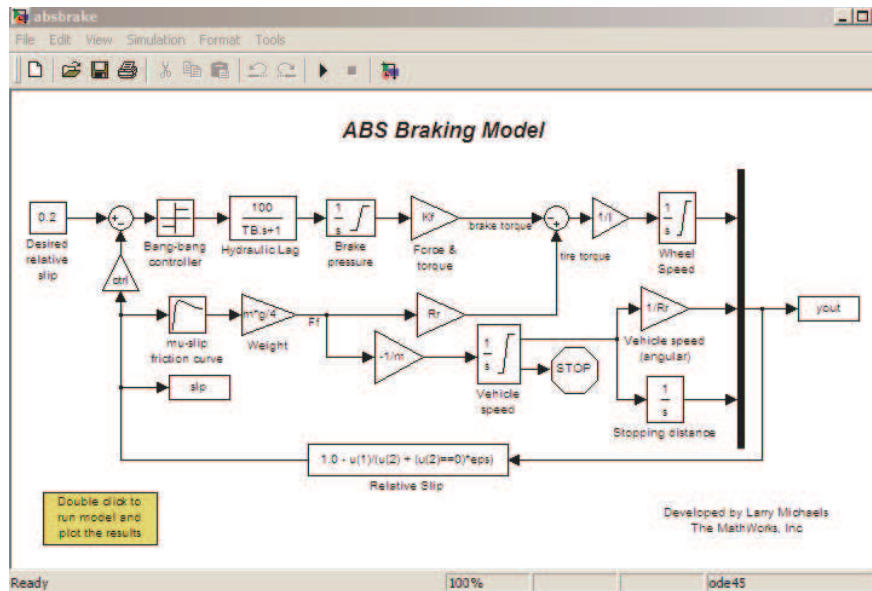
MATLAB&SIMULINK LE NOVITA' DELLA RELEASE 2008b

paolo.bizzarri@mathworks.it

EVOLUZIONE DEL MBD

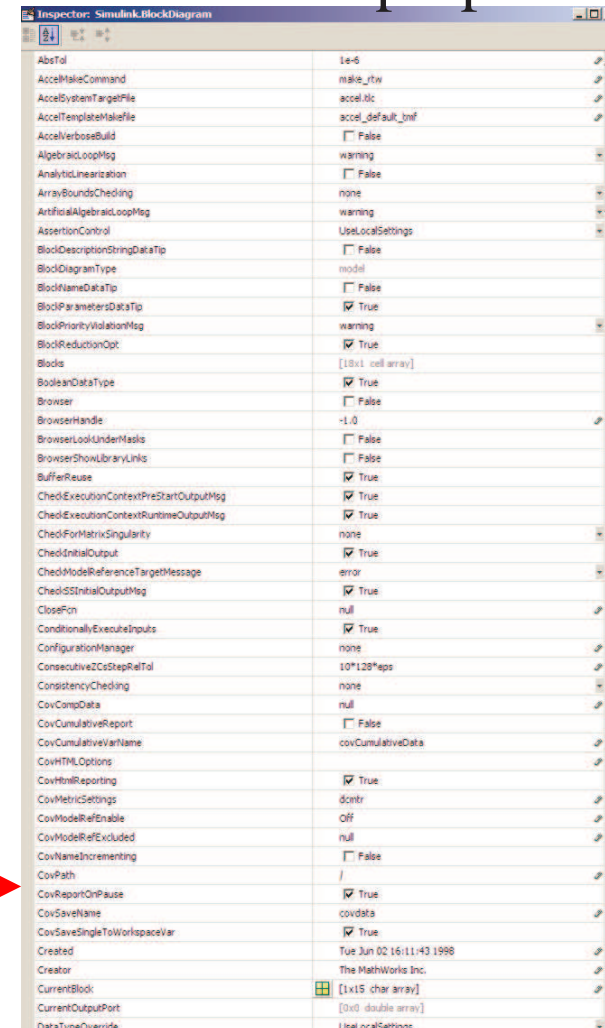
R11.1 1999

R2008b



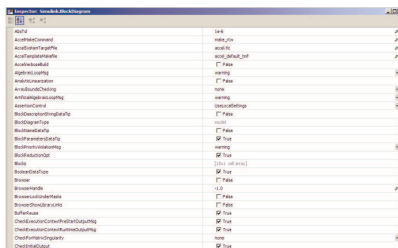
LE PROPRIETA' DEL MODELLO

2008 → 560 proprieta'



Property Name	Value
AbsTol	1e-6
AccelerateCommand	make_rtw
AcceleratorTargetFile	accel.tic
AcceleratorTemplateFile	accel_default.tmf
AcceleratorBuild	<input type="checkbox"/> False
AlgebraicLoopMsg	warning
AnalyticLinearization	<input type="checkbox"/> False
ArrayBoundsChecking	none
ArtificialAlgebraicLoopMsg	warning
AssertionControl	UseLocalSettings
BlockDescriptionStringDataTip	<input type="checkbox"/> False
BlockDiagramType	model
BlockNameDataTip	<input type="checkbox"/> False
BlockParametersDataTip	<input checked="" type="checkbox"/> True
BlockPriorityViolationMsg	warning
BlockReductionOpt	<input checked="" type="checkbox"/> True
Blocks	[18x1 cell array]
BooleanDataType	<input checked="" type="checkbox"/> True
Browser	<input type="checkbox"/> False
BrowserHandle	-1.0
BrowserLookUnderMask	<input type="checkbox"/> False
BrowserShowLibraryLinks	<input type="checkbox"/> False
BufferReuse	<input checked="" type="checkbox"/> True
CheckExecutionContextPreStartOutputMsg	<input checked="" type="checkbox"/> True
CheckExecutionContextRuntimeOutputMsg	<input checked="" type="checkbox"/> True
CheckForMatrixSingularity	none
CheckInitialOutput	<input checked="" type="checkbox"/> True
CheckModeReferenceTargetMessage	error
CheckSSInitialOutputMsg	<input checked="" type="checkbox"/> True
CloseFcn	null
ConditionallyExecuteInputs	<input checked="" type="checkbox"/> True
ConfigurationManager	none
ConsecutiveZCStepsRelTol	10*128^eps
ConsistencyChecking	none
CovCompData	null
CovCumulativeReport	<input type="checkbox"/> False
CovCumulativeVarName	covCumulativeData
CovHTMLOptions	
CovHTMLReporting	<input checked="" type="checkbox"/> True
CovMetricSettings	dontr
CovModelRefEnabled	off
CovModelRefExcluded	null
CovNameIncrementing	<input type="checkbox"/> False
CovPath	/
CovReportOnPause	<input checked="" type="checkbox"/> True
CovSaveName	covdata
CovSaveSingleToWorkspaceVar	<input checked="" type="checkbox"/> True
Created	Tue Jun 02 16:11:43 1998
Creator	The MathWorks Inc.
CurrentBlock	[1x15 char array]
CurrentOutputPort	[0x0 double array]
DataTypeOverride	UseLocalSettings

1999 → 156 proprieta'



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Progettazione basata sulla modellazione

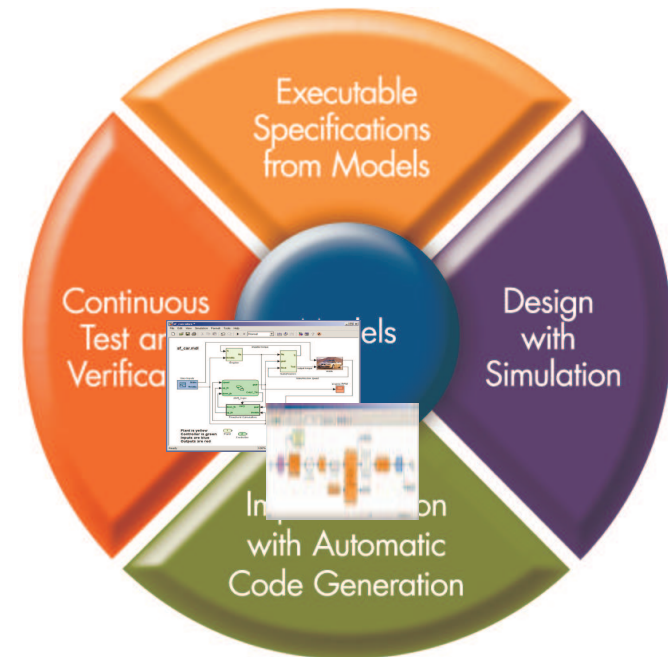
- SIMULAZIONE
- LINEARIZZAZIONE E CONTROLLO
- SCALATURA IN VIRGOLA FISSA
- GENERAZIONE DI CODICE C/C++
- GENERAZIONE DI CODICE VHDL
- GENERAZIONE DELLA DOCUMENTAZIONE

- GENERAZIONE DEI TEST
- VERIFICA FORMALE
- LINK AI REQUISITI (TRACCIABILITA')
- CONFORMITA' A STANDARD INTERNAZIONALI

•GESTIONE DI PROGETTI COMPLESSI

•MODELLAZIONE FISICA (ELETTRONICA, MECCANICA, IDRAULICA)

•STIMA DEI PARAMETRI



WHAT'S NEW IN 2008b

MATLAB NEWS

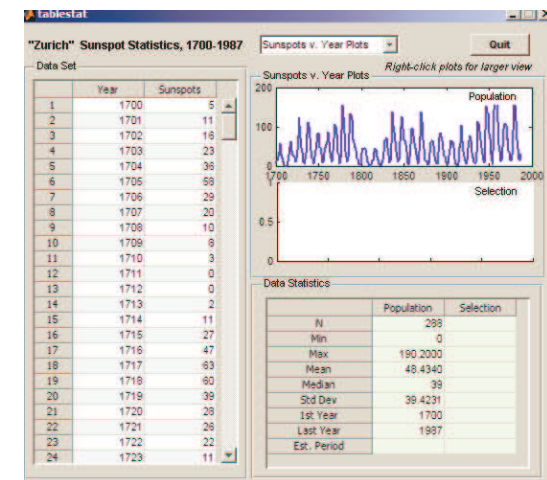
NUOVA PROGRAMMAZIONE AD OGGETTI (2008a)

`doc classdef`

`container.Map`; (2008b)

GRAPHICAL USER INTERFACES POTENZIATE

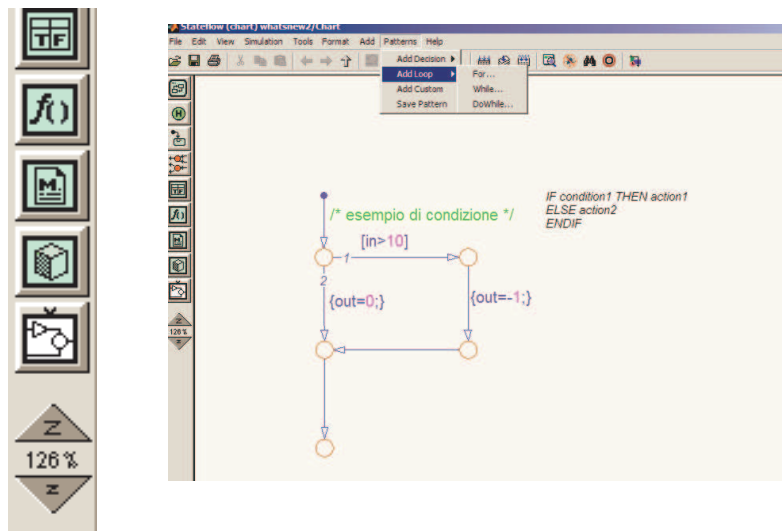
`tablestats`;



WHAT'S NEW IN 2008b

SIMULINK/STATEFLOW NEWS

- **SIMULINK in STATEFLOW**
- **STATEFLOW PATTERN REUSE**
- **SIMSCAPE PHYSICAL AUTHORIZING LANGUAGE**



WHAT'S NEW IN 2008b

EMBEDDED CODER NEWS

- PIL SUPPORT
- ENCAPSULATED C++
- ARCHITETTURA DEL CODICE

[Summary](#)
[Subsystem Report](#)
[Traceability Report](#)
Generated Source Files
[ert_main.cpp](#)
[rtwdemo_cppencap.cpp](#)
[rtwdemo_cppencap.h](#)
[rtwdemo_cppencap_private.h](#)
[rtwdemo_cppencap_types.h](#)
[rtwtypes.h](#)

```
43 }  
44  
45 /* Model step function */  
46 boolean_T ModelClass::step_method(const real_T &arg_In1, const BusObject  
47 *arg_In2, uint8_T *arg_In3, const BusObject arg_In4, BusObject *arg_Out2)  
48 {  
49     /* local block i/o variables */  
50     real_T rtb_UnitDelay;  
51  
52     /* specified return value */  
53     boolean_T arg_Out1;  
54  
55     {  
56         BusObject rtb_BusConversion_InsertedFor_0;  
57         real_T rtb_pressure[20];  
58         int32_T i;  
59         if (rtM->Timing.TaskCounters.TID[1] == 0) {  
60             /* UnitDelay: '<Root>/Unit_Delay' */  
61             rtb_UnitDelay = rtDWork.UnitDelay_DSTATE;  
62  
63             /* Outputs for atomic SubSystem: '<Root>/Rel_op_Subsys' */  
64             Rel_op_Subsys(rtb_UnitDelay, 10.0, arg_In1, 2.0, &rtB.Rel_op_Subsys_j);  
65  
66             /* end of Outputs for SubSystem: '<Root>/Rel_op_Subsys' */
```

WHAT'S NEW IN 2008b

CONCLUSIONI

- **FUSIONE SEMPRE PIU' SPINTA TRA SIMULINK E STATEFLOW**
- **PHYSICAL MODELLING**
- **CODE GENERATION**
- **TEST GENERATION**

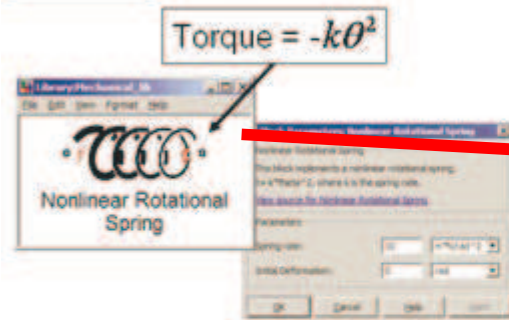
GRAZIE!!!

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WHAT'S NEW IN 2008b

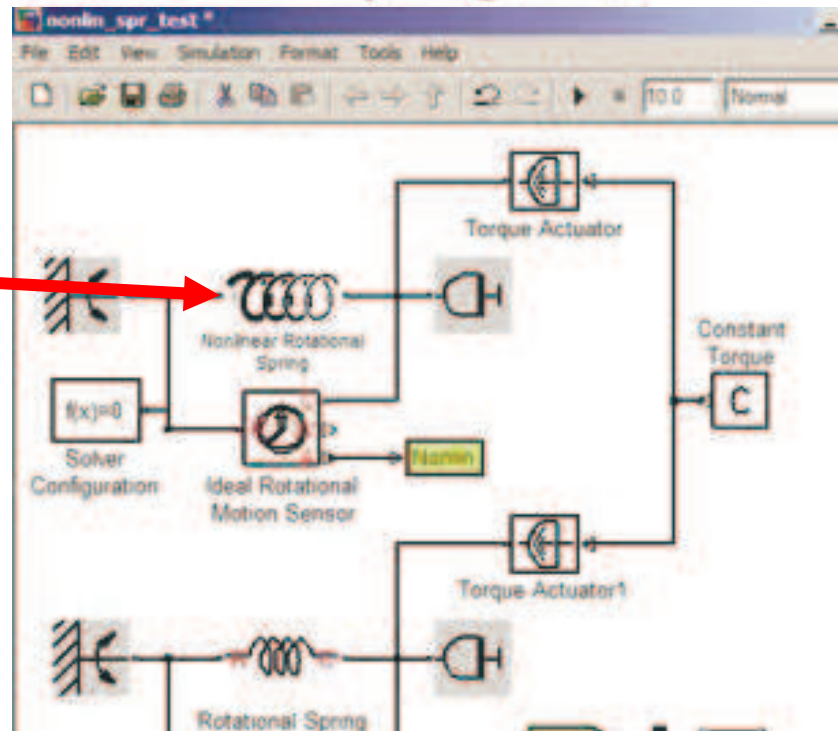
Simscape Language: Nonlinear Spring

Model:



Problem: Create a new physical modeling component for use in the Simulink environment using this equation.

Solution: Use the [Simscape language](#) to model the component.



SIMSCAPE MATLAB LANG

Model:

$$\text{Torque} = -k\theta^2$$



Create Reusable Components

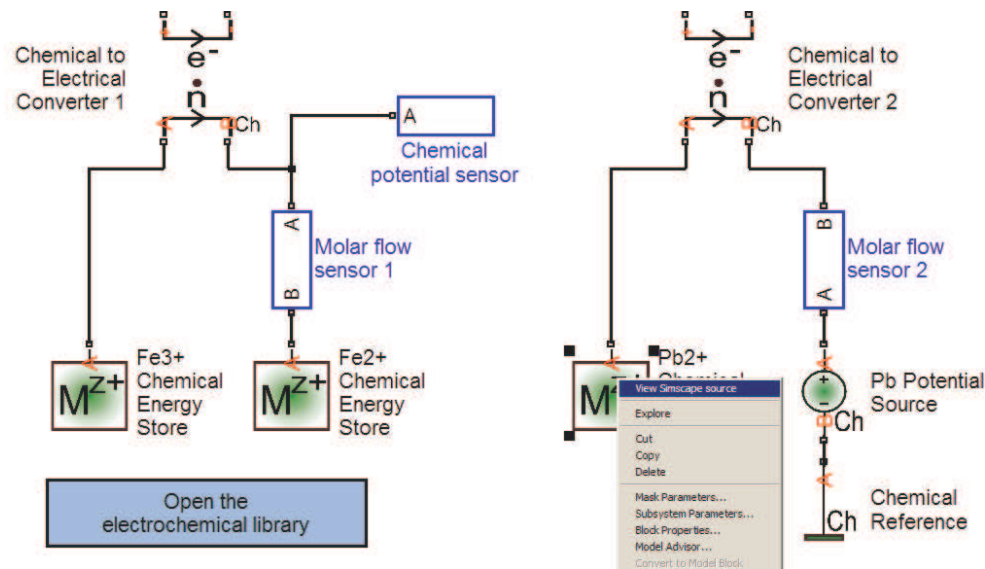
```

1 component NonlinearRotSpring
2 % Nonlinear Rotational Spring
3 % This block implements a nonlinear rotational spring.
4 %  $t = -k * \theta^2$ , where k is the spring rate.
5
6 nodes
7 r = foundation.mechanical.rotational.rotational; % r:left
8 c = foundation.mechanical.rotational.rotational; % c:right
9 end
10
11 variables
12 t = { 0, 'N*m' }; % torque through
13 w = { 0, 'rad/s' }; % velocity across
14 theta = { 0, 'rad' };
15 end
16
17 parameters
18 k = { 10, 'N*m/rad^2' }; % Spring rate
19 theta0 = { 0, 'rad' }; % Initial Deformation
20 end
21
22 function setup
23 if k < 0
24 error('Spring rate must be greater than 0');
25 end
26 across( w, r.w, c.w ); % velocity variable
27 through( t, r.t, c.t ); % torque variable
28 theta = theta0;
29 end
30
31 equation
32 t == -k * theta * theta;
33 w == theta.der;
34 end
    
```

$$\text{Torque} = -k\theta^2$$

$$\text{Angular Velocity} = \frac{d\theta}{dt}$$

LIBRERIE FISICHE CUSTOMIZZATE



>>ssc_electrochemical_battery

Open the electrochemical library

