Model-Based Code Generation with SIMULINK

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The MathWorks, Inc.

SDP Workshop
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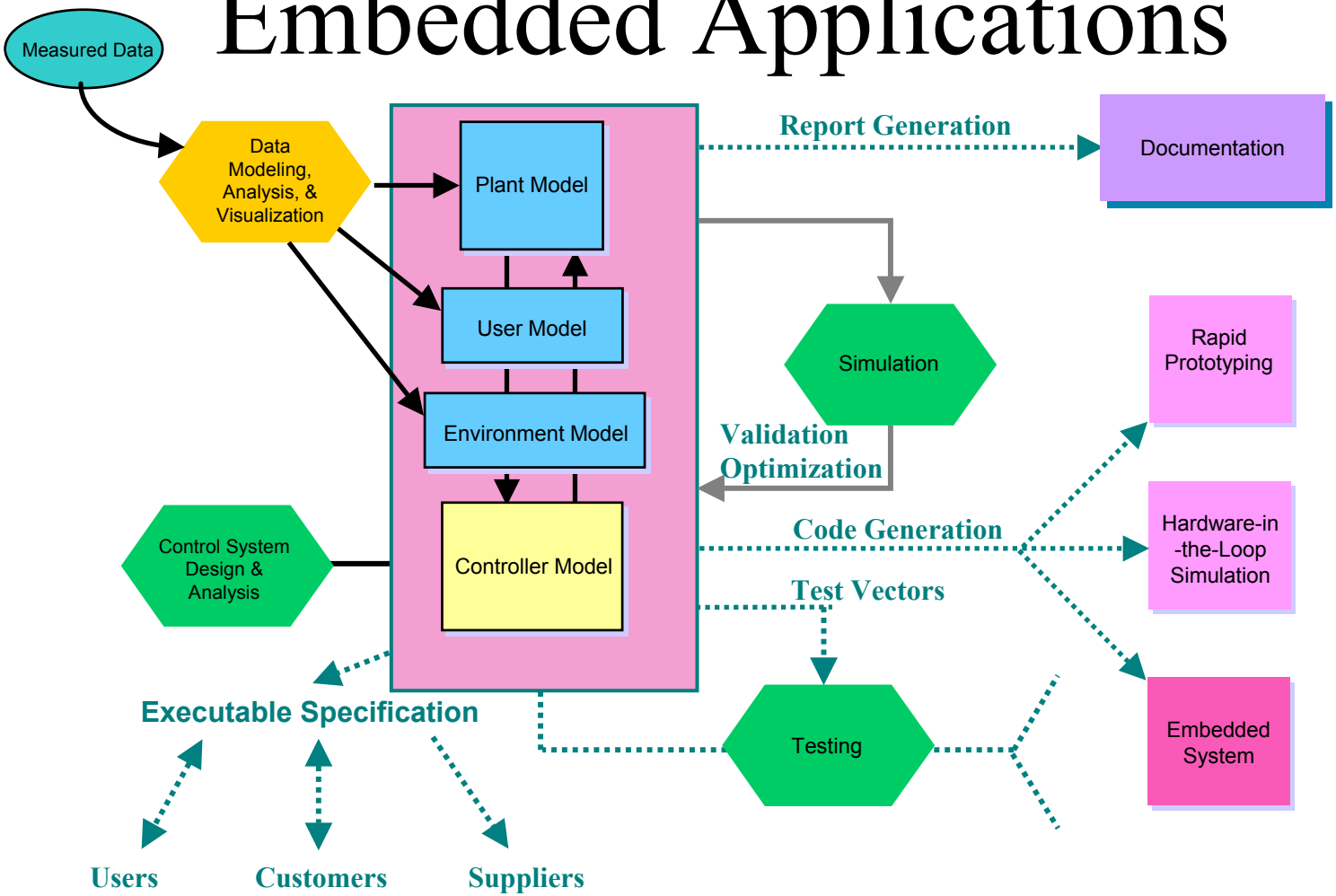
MATLAB's historical and intellectual basis is numerical linear algebra.

MathWorks's commercial success derives from applications in technical computing.

Model-Based Design for Embedded Applications



ac_model

File Edit View Simulation Format Tools Help

Normal

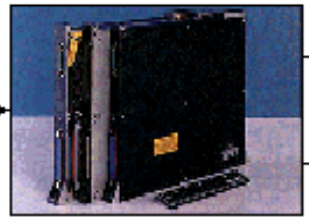
High Angle of Attack
Digital Flight Control System

Pilot

Analog
or Digital

Analog

DAP



Controllers

Act. Cmd.

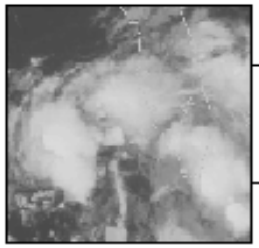
Cmd. [Linear] Act. Pos. Act. Meas.

Configurable
Actuator

Actuator

ActM

Actuator Sensor



Dryden
Wind Gust

wdot
gust

qdot
gust

Aircraft Dynamic Model

wdot

qdot

q

Alpha

w dot

q dot Nz

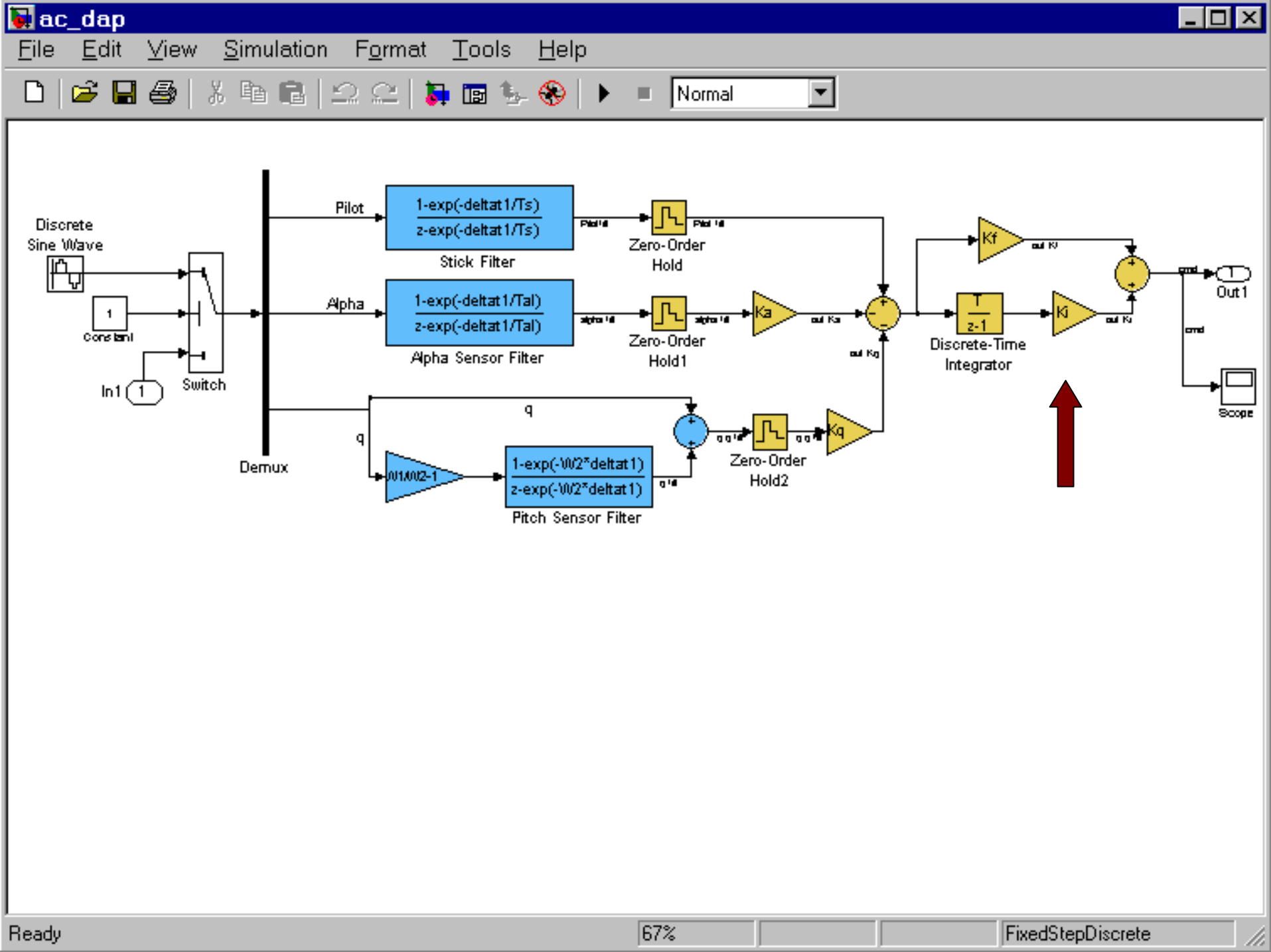
q

Nz

Pilot
G-Force
Calculation

Stick
Alpha
q
Nz

Ready 100% ode4


ac_dap
File Edit View Simulation Format Tools Help
Normal
Discrete Sine Wave
Constant
In1
Switch
Demux
Pilot
Alpha
q
q
1-exp(-deltat1/Ts)
z-exp(-deltat1/Ts)
Stick Filter
Zero-Order Hold
1-exp(-deltat1/Tal)
z-exp(-deltat1/Tal)
Alpha Sensor Filter
Zero-Order Hold1
1-exp(-W2*deltat1)
z-exp(-W2*deltat1)
Pitch Sensor Filter
Zero-Order Hold2
Ka
Kq
Kf
Ki
Discrete-Time Integrator
Out1
Scope
Ready
67%
FixedStepDiscrete

```
/* DiscreteIntegrator: '<Root>/Discrete-Time Integrator'
 *
 * Regarding '<Root>/Discrete-Time Integrator':
 *    Unlimited, w/o Saturation Port
 */
rtB.temp11 = rtDWork.Discrete_Time_Integrator_DSTATE;

/* Gain: '<Root>/Gain1'
 *
 * Regarding '<Root>/Gain1':
 *   Gain value: rtP.Gain1_Gain
 */
rtB.temp11 *= rtP.Gain1_Gain;

/* Sum: '<Root>/Sum' */
rtB.cmd = rtB.temp10 + rtB.temp11;

/* Outport: '<Root>/Out1' */
rtY.Out1 = rtB.cmd;
```