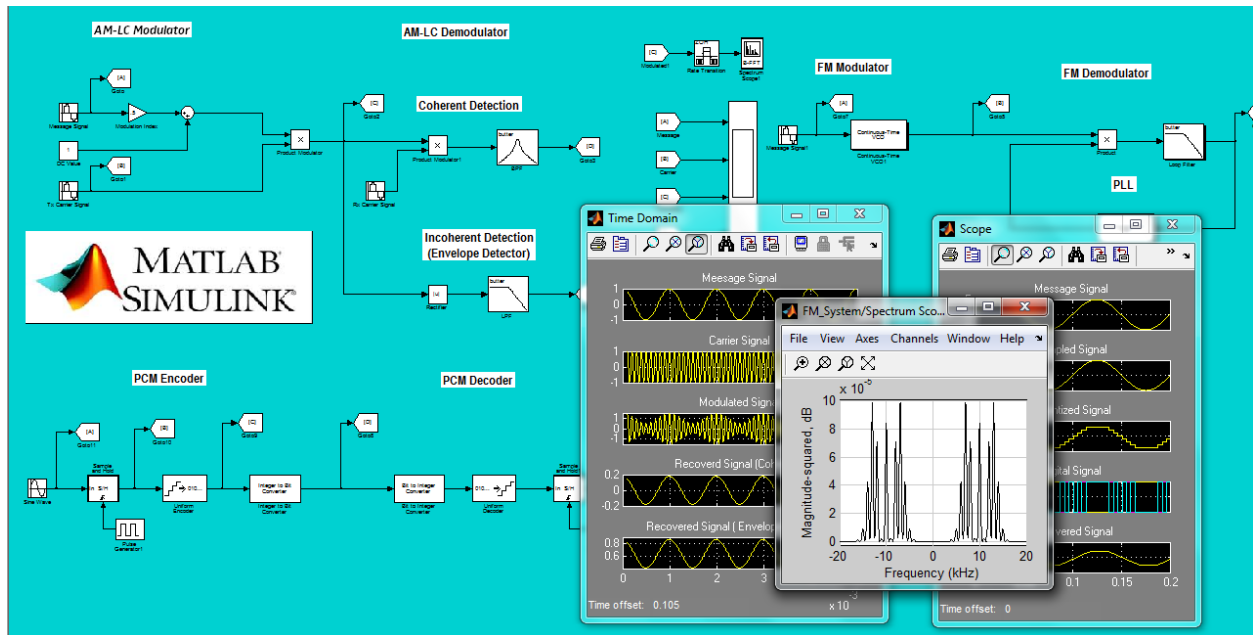


# Modeling Communication Systems Using Simulink

## Frequency Modulation Model



Eng. Anas Al-ashqar

---

# **Modeling Communication Systems Using Simulink: Frequency Modulation Model**

Eng. Anas Al-ashqar

Publication date 16-Dec-2013 20:04:58

Copyright © 2014 Anas Al-ashqar

---

---

# Table of Contents

- 1. Model Version ..... 1
- 2. FM System Model ..... 2
  - 2.1. Blocks ..... 2
    - 2.1.1. Parameters ..... 2
    - 2.1.2. Block Execution Order ..... 5

---

# List of Figures

2.1. FM\_System ..... 2

---

## List of Tables

2.1. "Goto" Parameters .....	2
2.2. "Goto2" Parameters .....	2
2.3. "Goto3" Parameters .....	3
2.4. "Loop Filter" Parameters .....	3
2.5. "Message" Parameters .....	3
2.6. "Message Signal" Parameters .....	3
2.7. "Modulated" Parameters .....	4
2.8. "Modulated " Parameters .....	4
2.9. "Product" Parameters .....	4
2.10. "Rate Transition" Parameters .....	5
2.11. "Recovered" Parameters .....	5

---

# Chapter 1. Model Version

**Version:** 1.9

**Last modified:** Fri Dec 13 15:56:39 2013

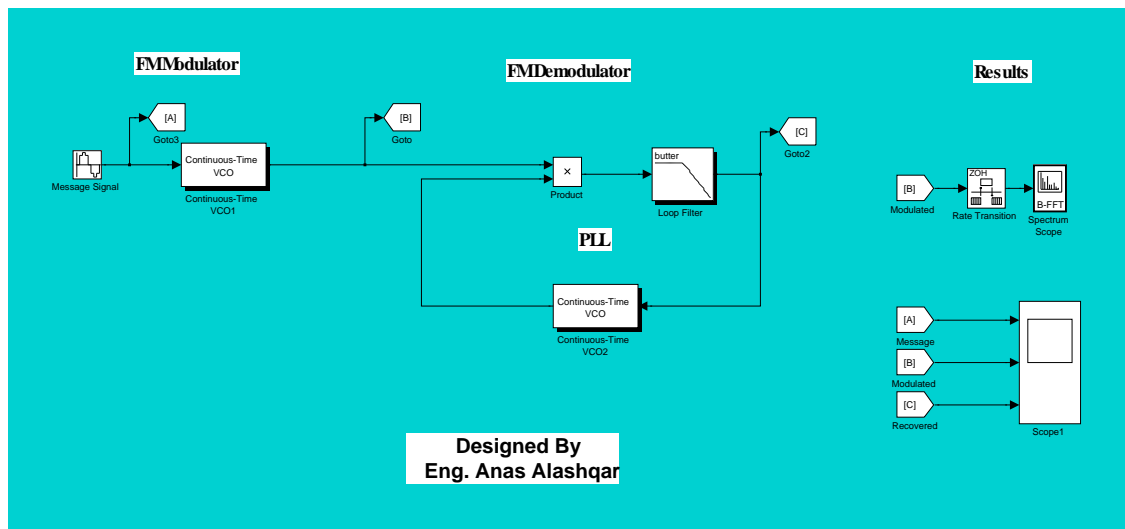
**Checksum:** 1871409496 3883502250 1176960890 2975936896

# Chapter 2. FM System Model

## Table of Contents

2.1. Blocks .....	2
2.1.1. Parameters .....	2
2.1.2. Block Execution Order .....	5

Figure 2.1. FM\_System



## 2.1. Blocks

### 2.1.1. Parameters

#### 2.1.1.1. "Goto" (Goto)

Table 2.1. "Goto" Parameters

Parameter	Value
Tag	B
Icon display	Tag
Tag visibility	local

#### 2.1.1.2. "Goto2" (Goto)

Table 2.2. "Goto2" Parameters

Parameter	Value
Tag	C

Parameter	Value
Icon display	Tag
Tag visibility	local

### 2.1.1.3. "Goto3" (Goto)

**Table 2.3. "Goto3" Parameters**

Parameter	Value
Tag	A
Icon display	Tag
Tag visibility	local

### 2.1.1.4. "Loop Filter" (StateSpace)

**Table 2.4. "Loop Filter" Parameters**

Parameter	Value
Design method	Butterworth
Filter type	Lowpass
Filter order	6
Passband edge frequency (rad/s)	$1e3*2*\pi$

### 2.1.1.5. "Message" (From)

**Table 2.5. "Message" Parameters**

Parameter	Value
Goto tag	A
Icon display	Tag

### 2.1.1.6. "Message Signal" (Sin)

**Table 2.6. "Message Signal" Parameters**

Parameter	Value
Sine type	Time based
Time (t)	Use simulation time



Parameter	Value
Amplitude	4
Bias	0
Frequency (rad/sec)	$2\pi \cdot 1000$
Phase (rad)	0
Samples per period	10
Number of offset samples	0
Sample time	1e-6
Interpret vector parameters as 1-D	on

### 2.1.1.7. "Modulated" (From)

**Table 2.7. "Modulated" Parameters**

Parameter	Value
Goto tag	B
Icon display	Tag

### 2.1.1.8. "Modulated " (From)

**Table 2.8. "Modulated " Parameters**

Parameter	Value
Goto tag	B
Icon display	Tag

### 2.1.1.9. "Product" (Product)

**Table 2.9. "Product" Parameters**

Parameter	Value
Number of inputs	2
Multiplication	Element-wise(.*)
Multiply over	All dimensions
Dimension	1
Require all inputs to have the same data type	off
Output minimum	[]

Parameter	Value
Output maximum	[]
Output data type	Inherit: Inherit via internal rule
Lock output data type setting against changes by the fixed-point tools	off
Integer rounding mode	Zero
Saturate on integer overflow	off
Sample time (-1 for inherited)	-1

### 2.1.1.10. "Rate Transition" (RateTransition)

**Table 2.10. "Rate Transition" Parameters**

Parameter	Value
Ensure data integrity during data transfer	on
Ensure deterministic data transfer (maximum delay)	on
Initial conditions	0
Output port sample time options	Specify
Sample time multiple(>0)	1
Output port sample time	1/40000

### 2.1.1.11. "Recovered" (From)

**Table 2.11. "Recovered" Parameters**

Parameter	Value
Goto tag	C
Icon display	Tag

## 2.1.2. Block Execution Order

1. Message Signal [3] (Sin)
2. Gain (Gain)
3. Abs (Abs)

4. Constant (Constant)
5. Relational Operator (RelationalOperator)
6. Math Function (Math)
7. IC (InitialCondition)
8. Integrator (Integrator)
9. Inherit Shape (S-Function)
10. sin (Fcn)
11. Inherit Shape (S-Function)
12. Loop Filter [3] (StateSpace)
13. Scope1 [5] (Scope)
14. Rate Transition [5] (RateTransition)
15. *Spectrum Scope*
16. Carrier frequency1 (Constant)
17. Check Signal Attributes (S-Function)
18. Reshape (Reshape)
19. Sensitivity (Gain)
20. Sum (Sum)
21. Check Signal Attributes (S-Function)
22. Check Signal Attributes (S-Function)
23. Carrier frequency1 (Constant)
24. Check Signal Attributes (S-Function)
25. Reshape (Reshape)
26. Gain (Gain)
27. Abs (Abs)
28. Constant (Constant)
29. Relational Operator (RelationalOperator)
30. Math Function (Math)
31. IC (InitialCondition)
32. Integrator (Integrator)
33. Inherit Shape (S-Function)
34. sin (Fcn)
35. Inherit Shape (S-Function)
36. Sensitivity (Gain)
37. Sum (Sum)
38. Check Signal Attributes (S-Function)
39. Check Signal Attributes (S-Function)
40. Product [4] (Product)