Chapter2

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today

2.1

What we know is the linear system must obey the superposition property.
The input-output description in Fig2.1(a) is :$y = a * u$.
Here a is a constant .It is eay to find the system(a) is a linear system.
The input-output decription in Fig2.1(b) is:$y = a * u + b$.
Here a and b are all constants.Thstify whether the system has the property of additivity Let:

$$y_1 = a * u_1 + b.$$

$$y_2 = a * u_2 + b.$$

then:

$$(y_1 + y_2) = a * (u_1 + u_2) + 2 * b$$

so it does not satisfy the property of additivity.therefore,it is a nonlinear system.
It is obviously the system in the Fig2.1(c) is a nonliear system.
When system(b) introduce $y - y_0$ as the new output,system(c) can be the linear system.

section*2.2 Because $g(t)$ is not zero,when $t \leq 0$,so the ideal lowpass filter is not causual and the ideal filter can't build in the real world.

section*2.3 It is easy to find the system is a linear system.
Testify whether the system is time-invariable:
Definine the initial time of input t_0,system input is $u(t)$,$t \geq t_0$,so it decides the output $y(t)$,$t \geq t_0$

$$y(t) = \begin{cases} u(t), & for \quad t_0 \leq t \leq \alpha \\ 0, & for \quad t \geq \alpha. \end{cases} \tag{1}$$