

Lecture 21

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- ▶ Introduction to linear filters

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- ▶ Linearity and time invariance

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- ▶ Linearity and time invariance
- ▶ Sinusoidal inputs

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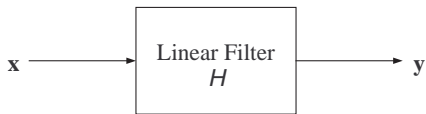
- ▶ Introduction to linear filters
- ▶ Linearity and time invariance
- ▶ Sinusoidal inputs; complex frequency response

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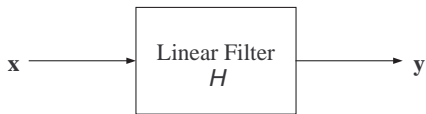
- ▶ Introduction to linear filters
- ▶ Linearity and time invariance
- ▶ Sinusoidal inputs; complex frequency response
- ▶ Exponential inputs

Linear Filters

Linear Filters

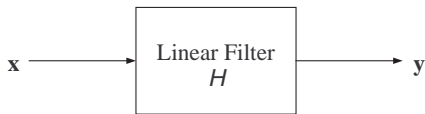


Linear Filters



- ▶ Filter input is a *sequence*

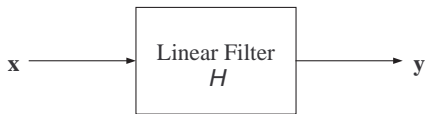
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$$y[n] = b_0x[n] + b_1x[n-1] + \cdots + b_Mx[n-M]$$

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- ▶ **Finite Impulse Response**

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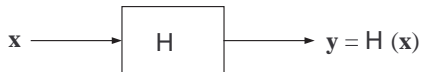
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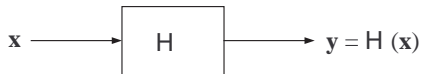
- ▶ **Finite Impulse Response** (also: *moving average*) filter

LTI: Linearity

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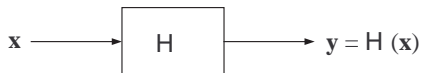
LTI: Linearity



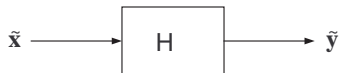
If also



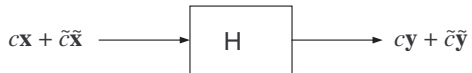
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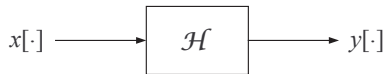
then



LTI: Time-Invariance

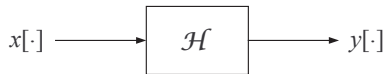
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then

