Time Series Analysis

Fall 2018

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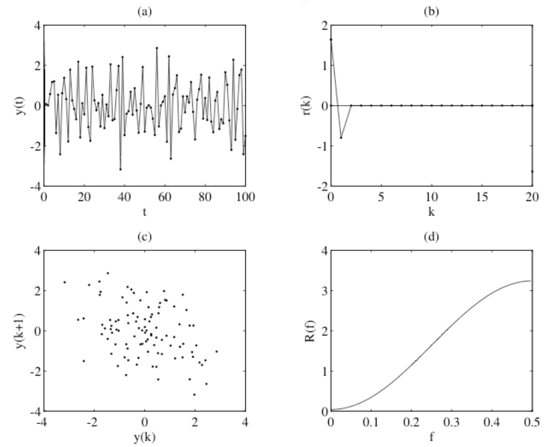
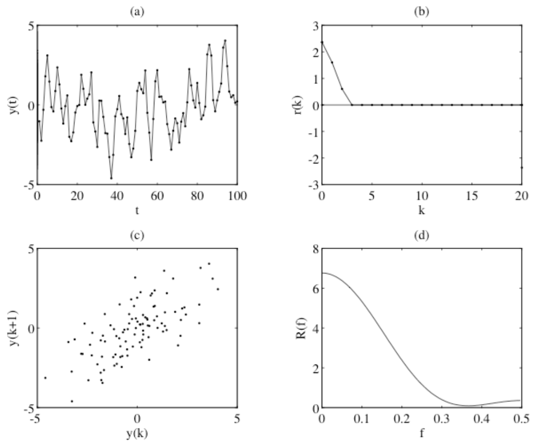
MA(1)-process



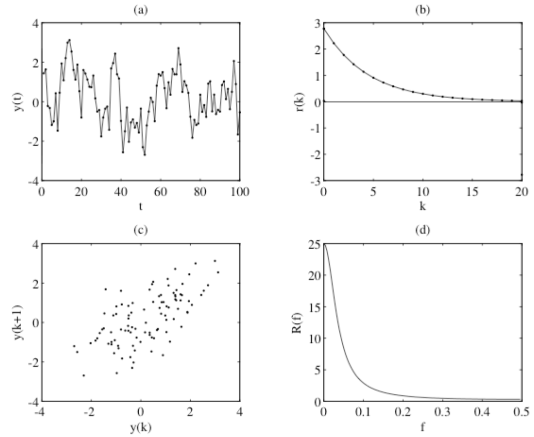
MA(1)–process $Y(t) = e(t) - 0.8e(t-1)$; (a) realisation, (b) covf. func., (c) scatter-plot and (d) spectral density.

MA(2)-process



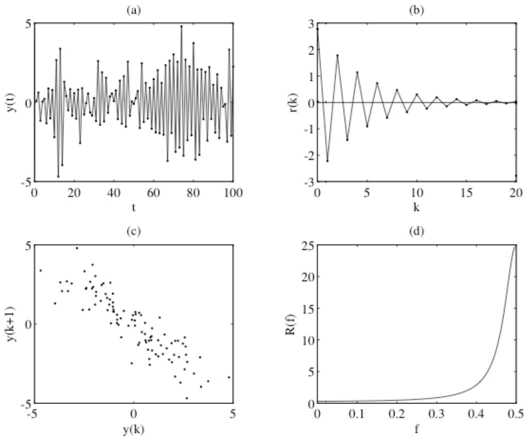
MA(2)–process $Y(t) = e(t) + e(t-1) + 0.6e(t-2)$.

AR(1)-process



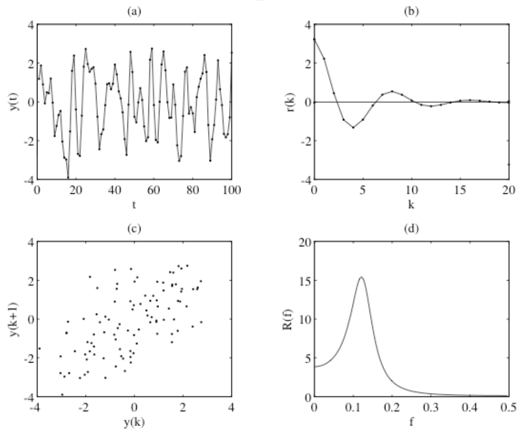
AR(1)-process $Y(t) = 0.8Y(t-1) + e(t)$; (a) realisation, (b) covf. func., (c) scatter-plot and (d) spectral density.

AR(1)-process



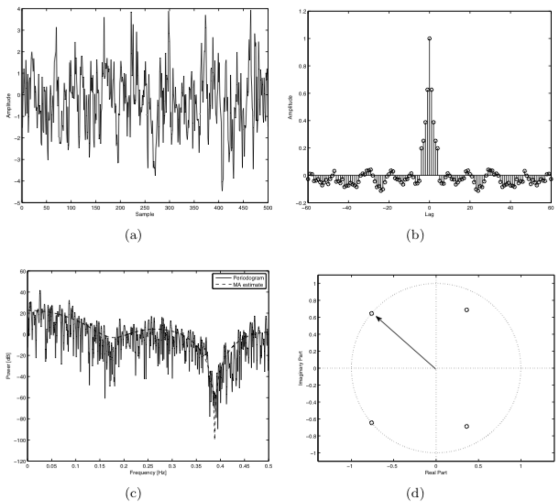
AR(1)-process $Y(t) = -0.8Y(t-1) + e(t)$; (a) realisation, (b) covf. func., (c) scatter-plot and (d) spectral density.

AR(2)-process

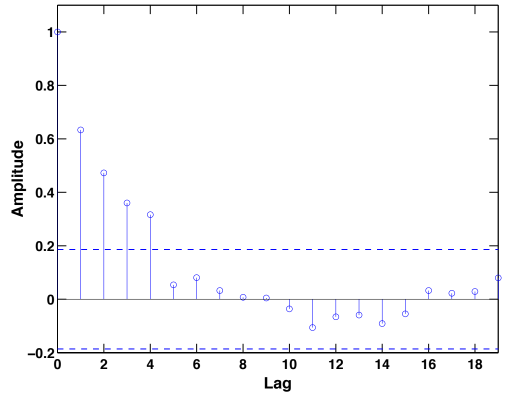


AR(2)-process $Y(t) = 1.131\,Y(t-1) - 0.64\,Y(t-2) + e(t)$;
(a) realisation, (b) covf. func., (c) scatter-plot and (d) spectral density.

MA(4)-process

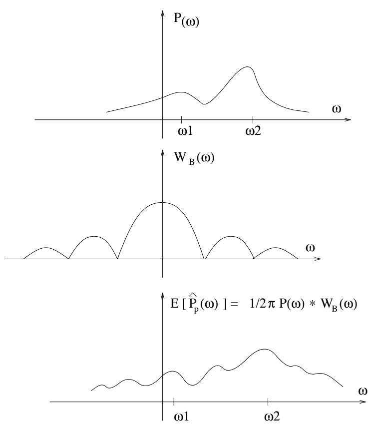


MA(4)-process

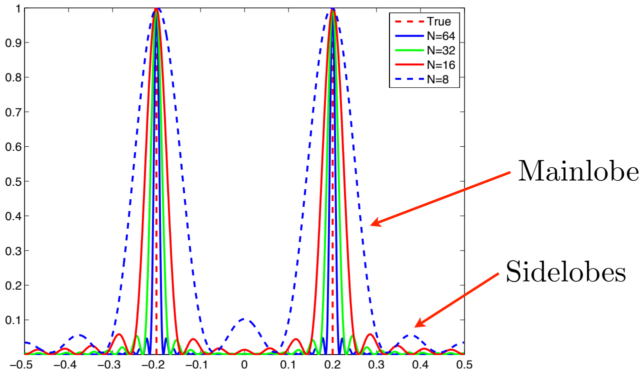


95% confidence interval

Finite length effects

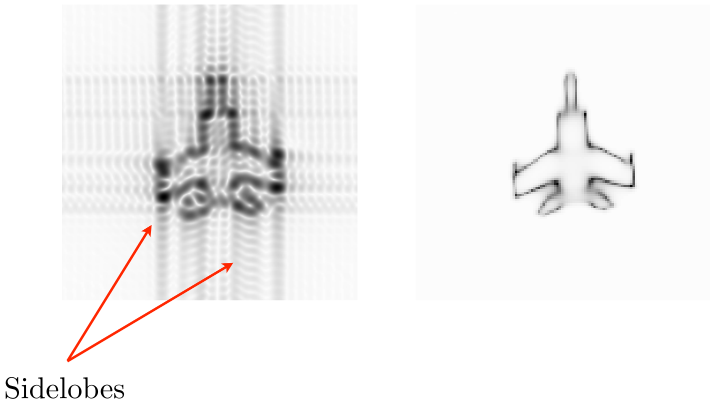


Finite length effects

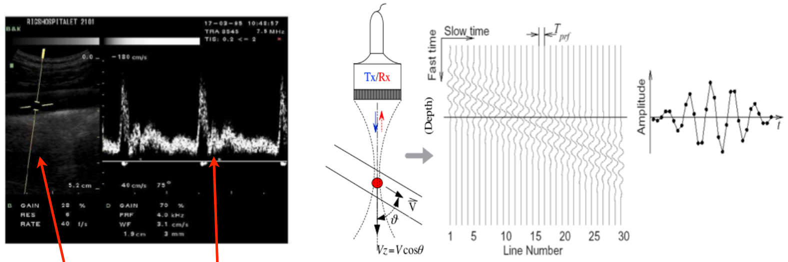



```
ff = (0:P-1)/P - 0.5;
X = fftshift( abs( fft(x,P).^2 ) );
plot(ff, X )
```


Finite length effects



Medical ultrasound

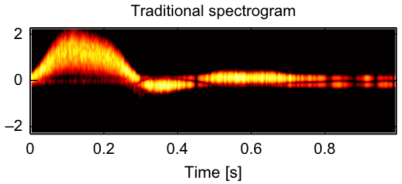


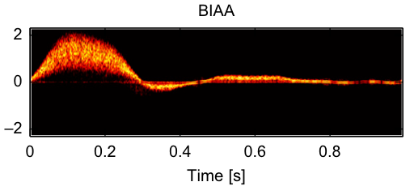
B-mode image

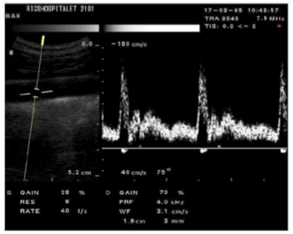
Blood velocity estimate

Estimating the velocity of blood is a spectral estimation problem

Medical ultrasound





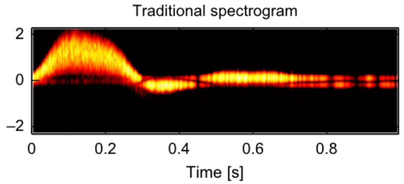


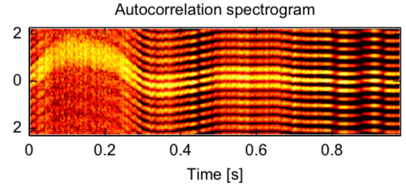
Use every emission

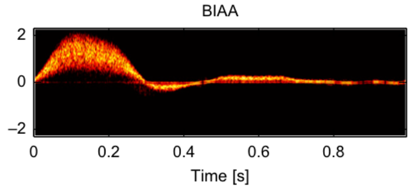
Need about 40% of emissions to form the B-mode image

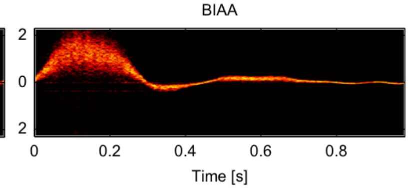
Time series analysis

Medical ultrasound









Use every emission

Use 30% of emissions

Time series analysis

This week

We will cover

- Stochastic processes. Identification.
- Reading instructions: Ch. 3, 4.1-4.2
- Problems: 3.5-3.10, 3.12-3.15