



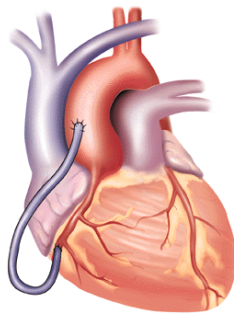
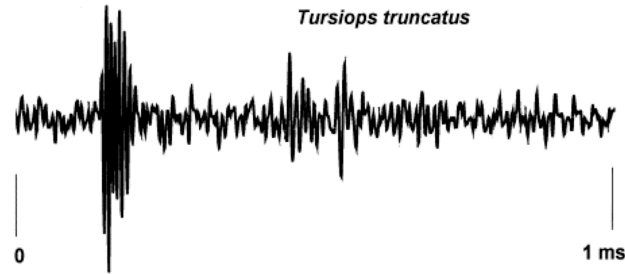
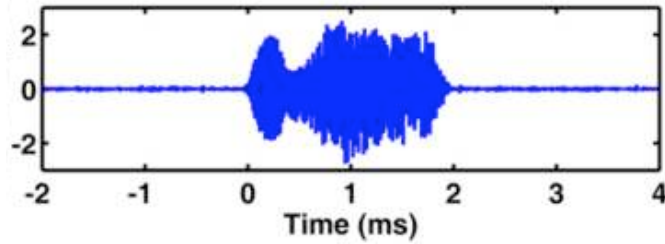
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# A Vector Approach to Transient Signal Processing

Florin-Marian Birleanu, Ion Candel, Cornel Ioana, Cedric Gervaise,  
Alexandru Serbanescu, and Gheorghe Serban

- Introduction – transient signals
- Vector samples processing (VeSP)
- VeSP tools
- Applications
- Conclusions

# Introduction – transient signals



# Outline

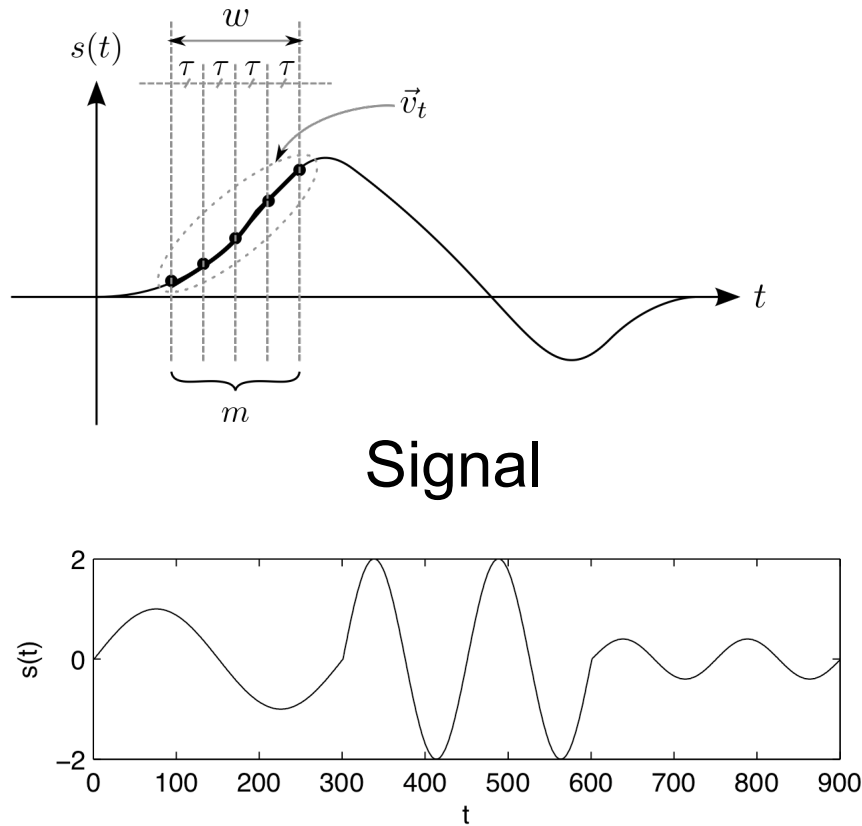
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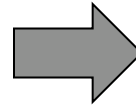
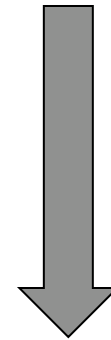
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# Vector samples processing (VeSP)

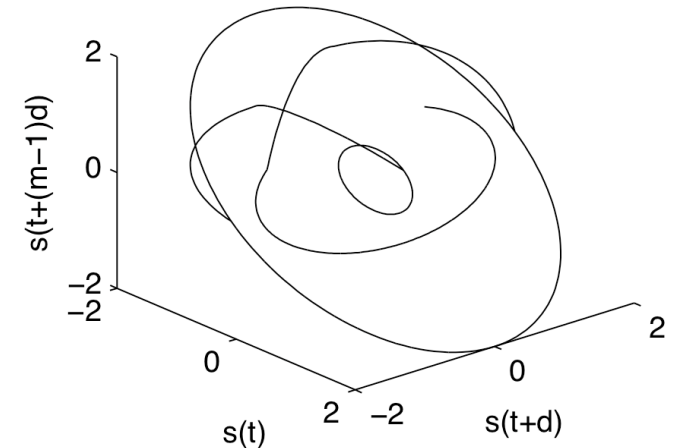
RPA (Recurrence plot analysis) – nonlinear time series analysis tool  
(from dynamical systems theory)



Signal



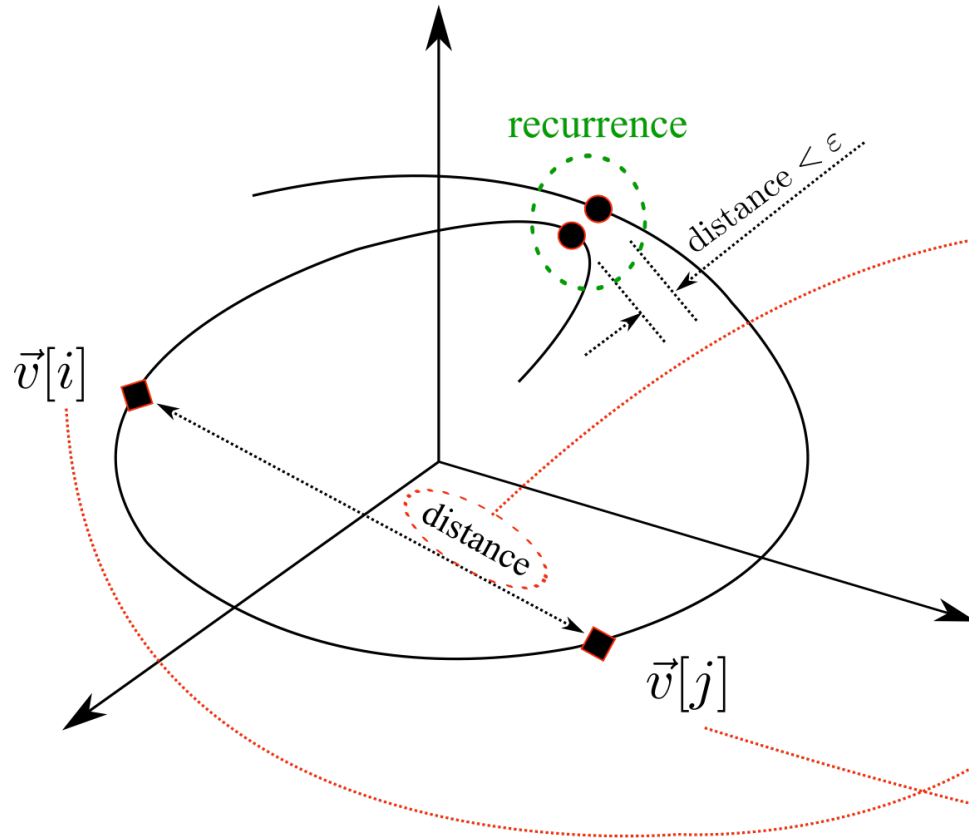
Trajectory



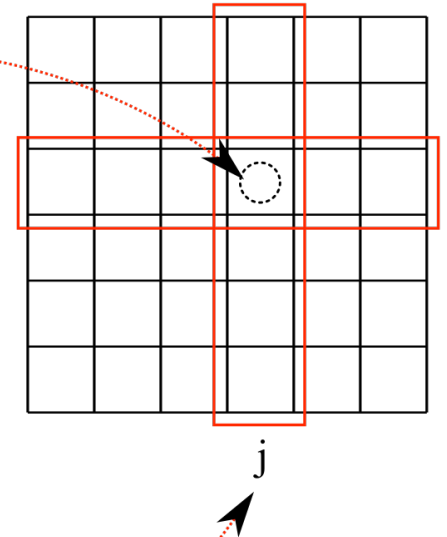
vector samples

# Vector samples processing (VeSP)

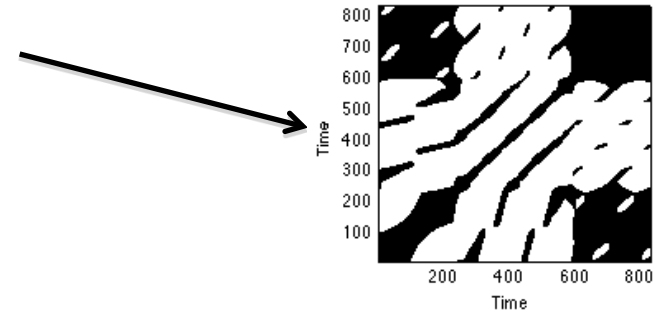
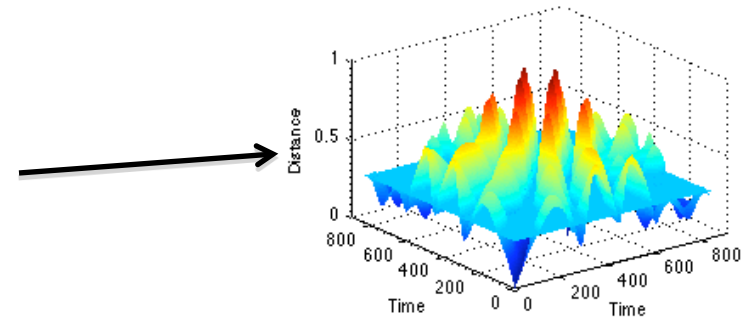
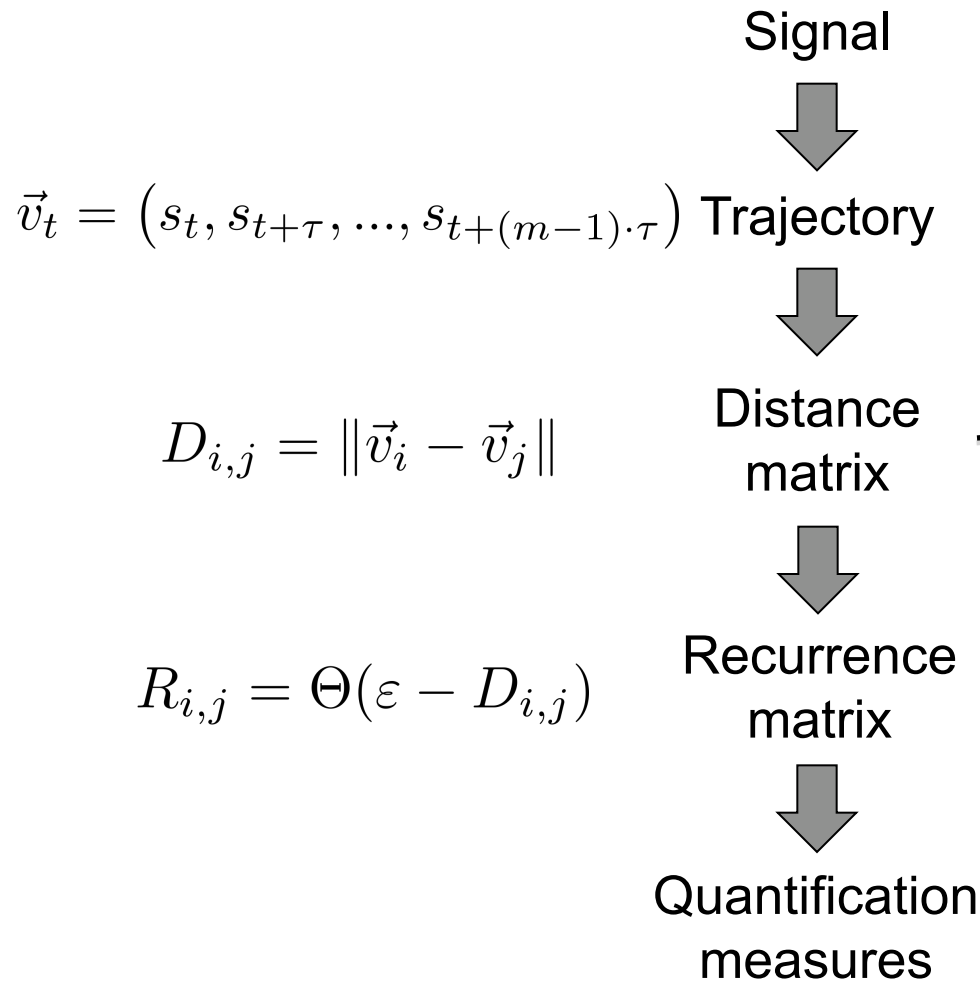
Phase Space Trajectory



Distance Matrix



# Vector samples processing (VeSP)



# Outline

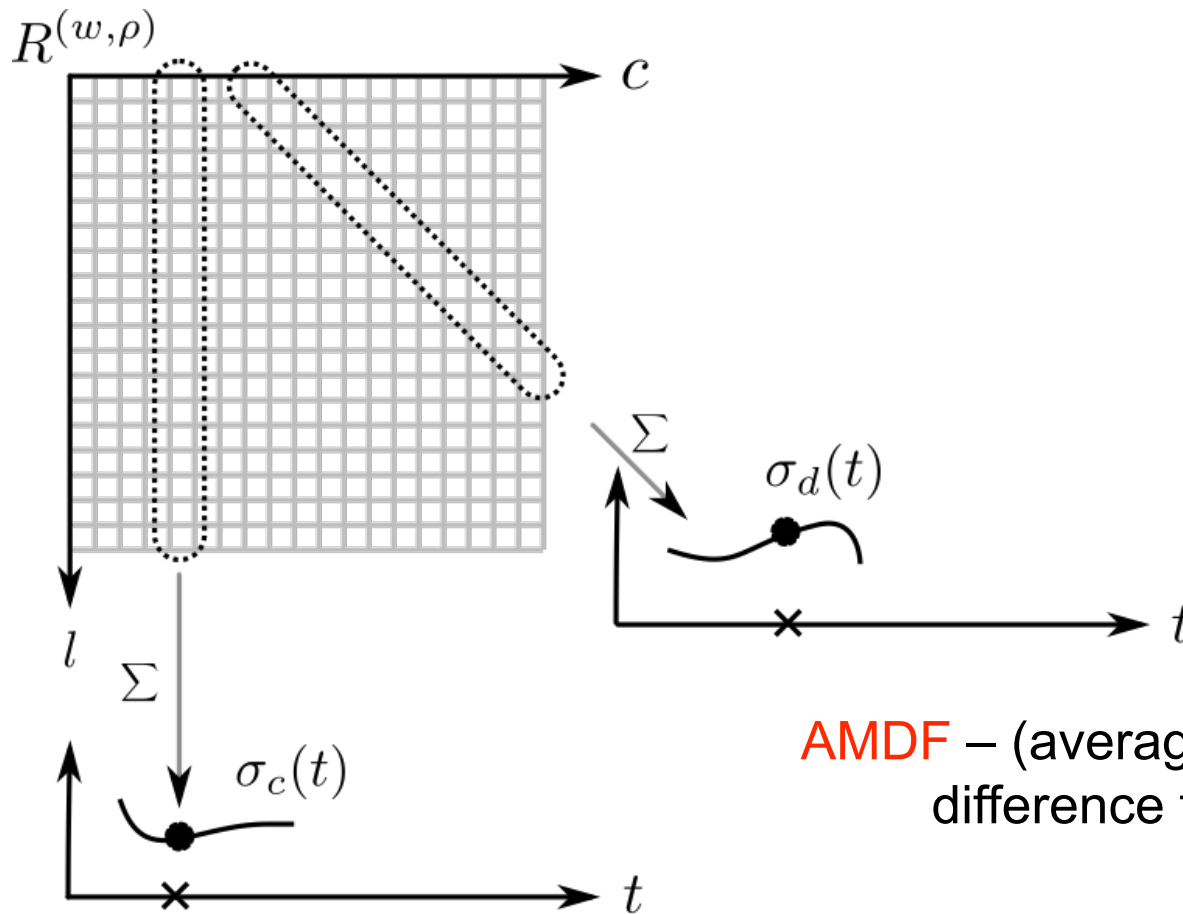
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# VeSP tools



**AMDF** – (averaged magnitude difference function)

**TDH** – (time distributed histogram)

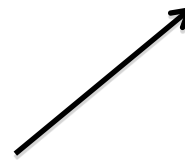
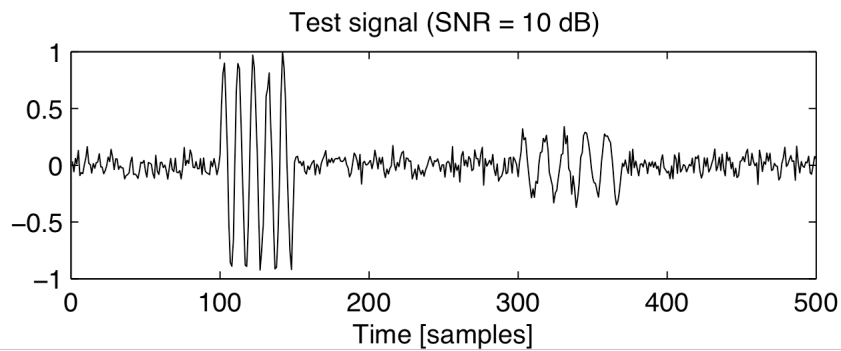
# Outline

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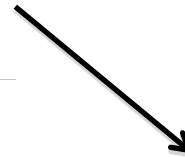


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# Applications

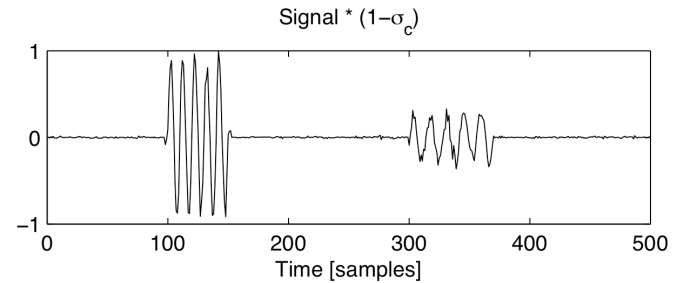
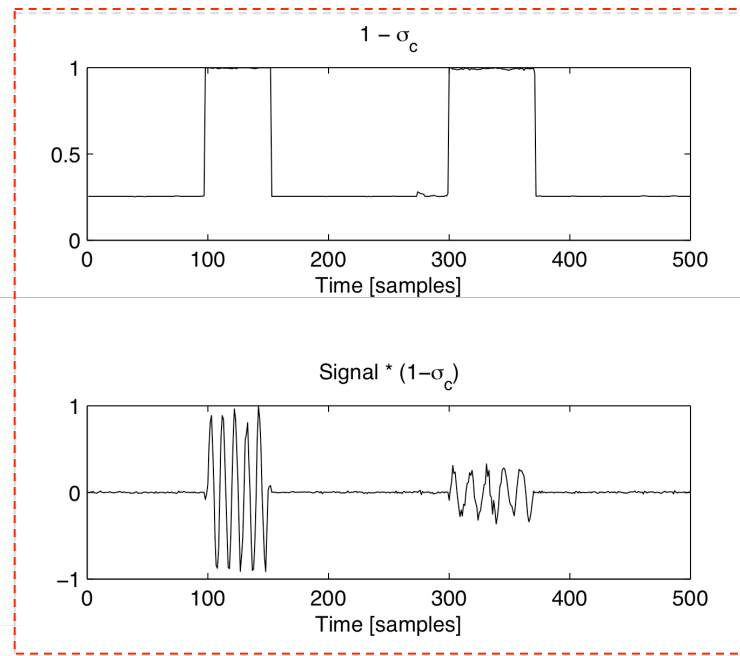
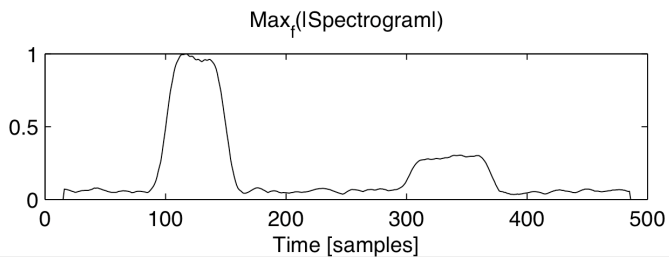
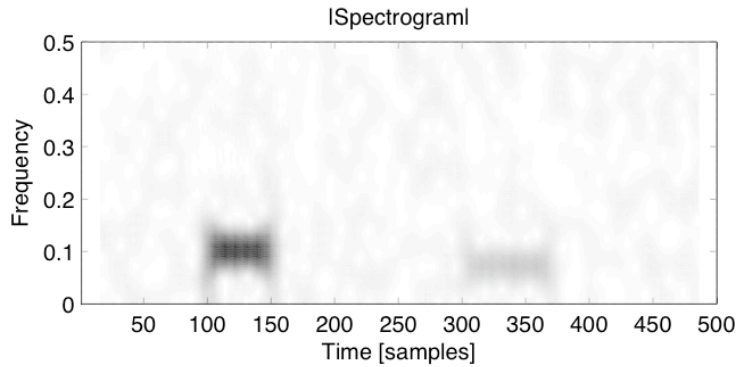
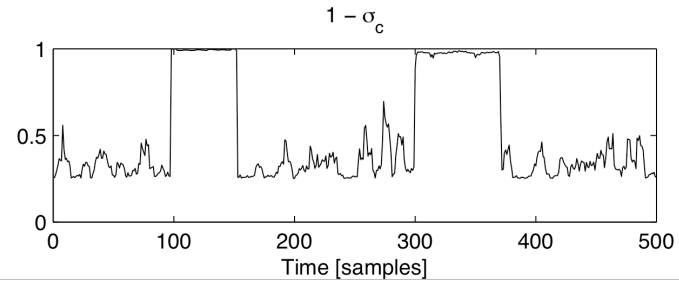
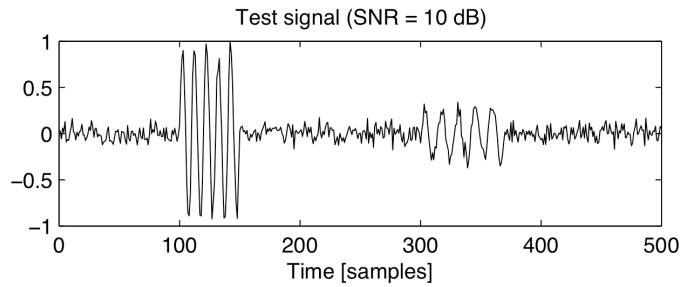


$\sigma_c$   
Detection



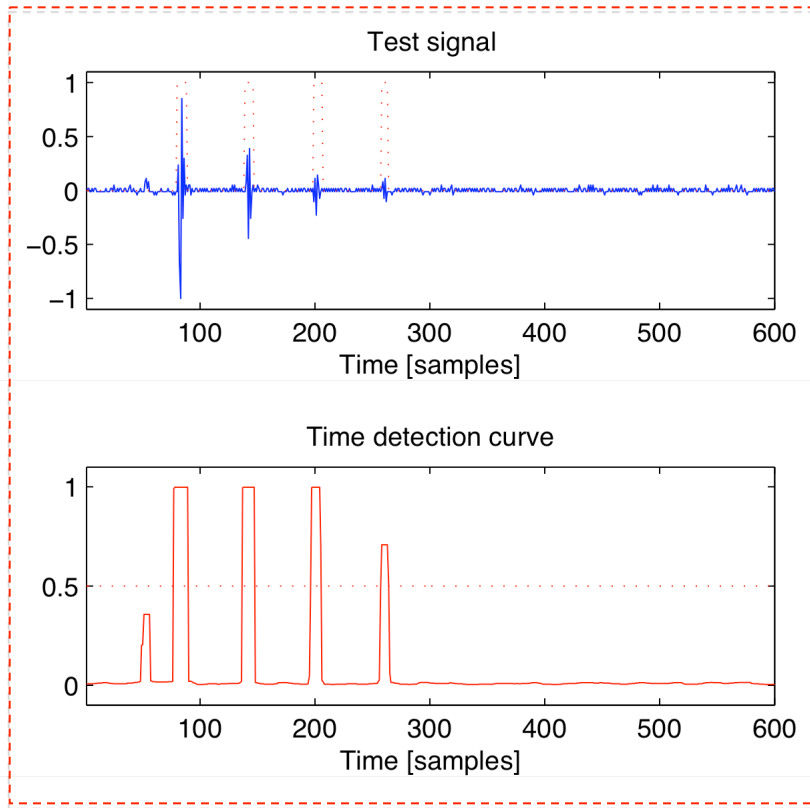
$\sigma_d$   
Fundamental frequency  
estimation

# Applications – detection in time

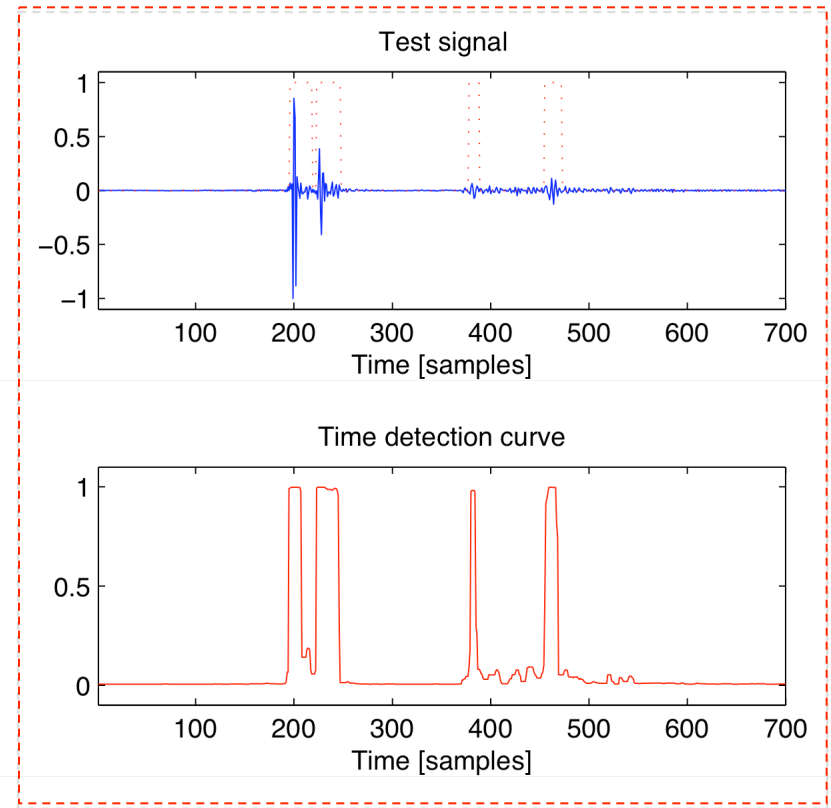


after 2 iterations

# Applications – detection in time

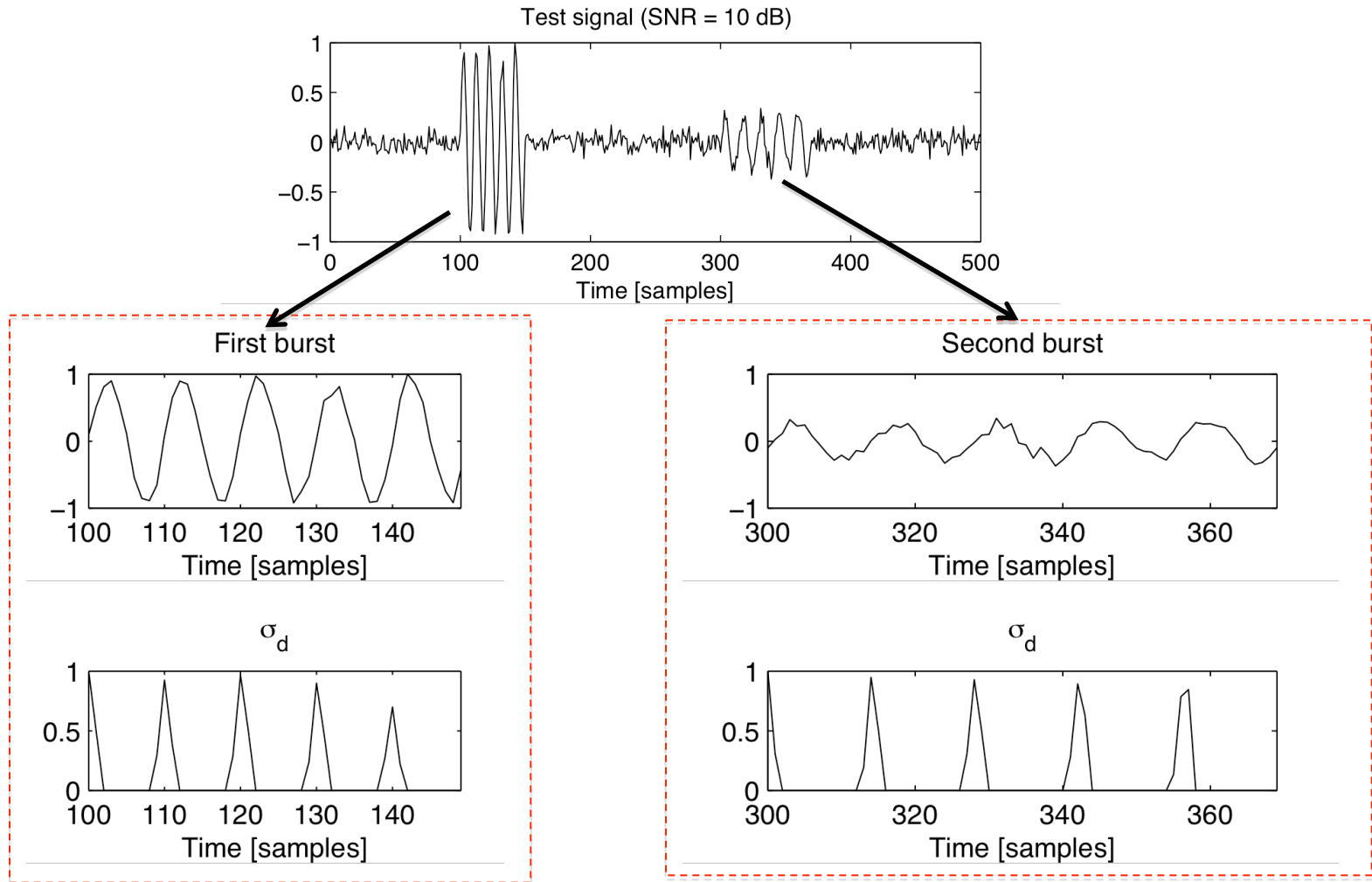


ultrasonic nondestructive testing

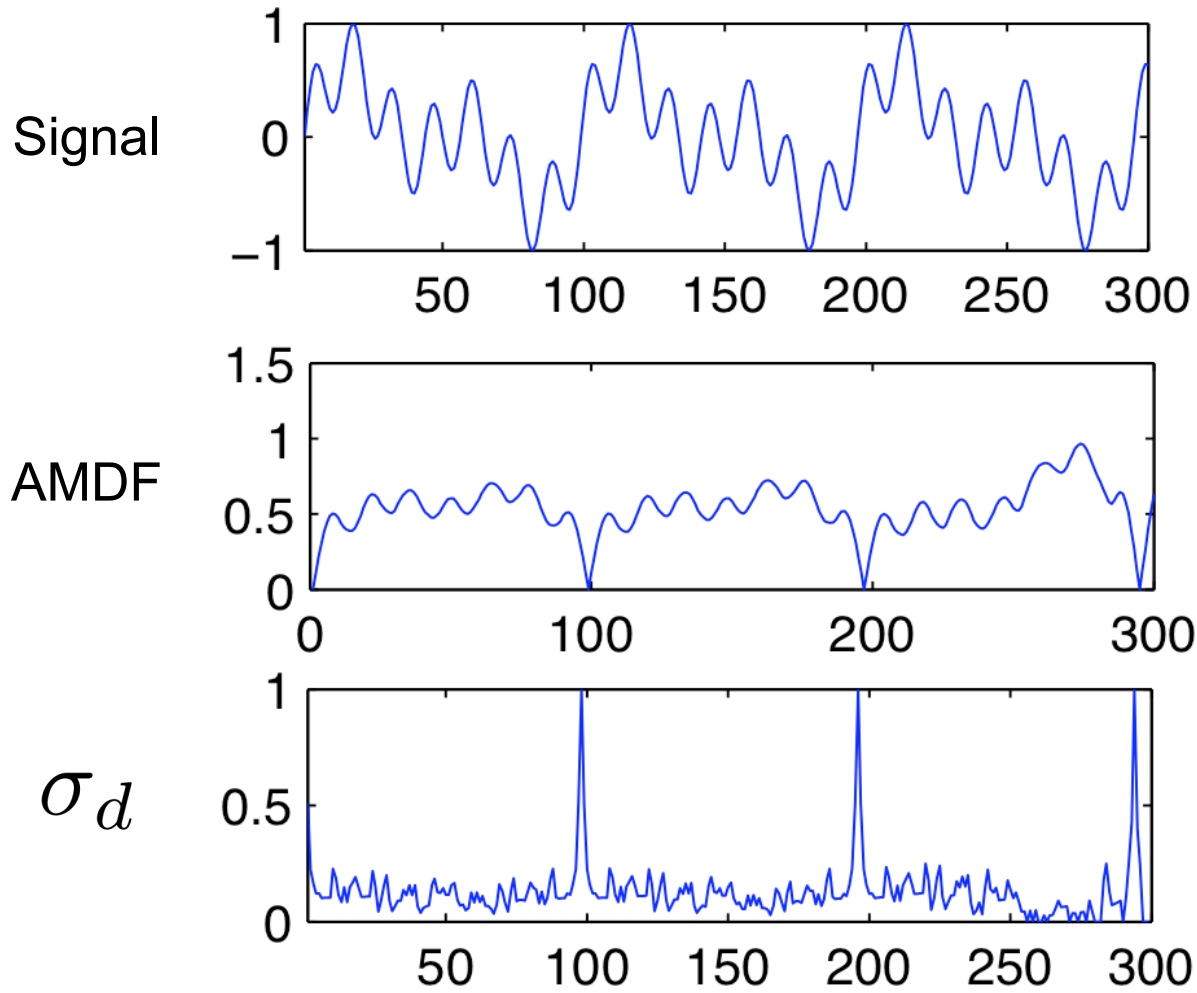


dolphin echolocation signals

# Applications – fundamental frequency estimation



# Applications – fundamental frequency estimation



# Outline

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# Conclusions

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- VeSP – a generic framework for transient signal processing
- $\sigma_c$  – detection, noise reduction
- $\sigma_d$  – fundamental frequency estimation
- (?) The influence of the parameters  $(\omega, \rho)$ .