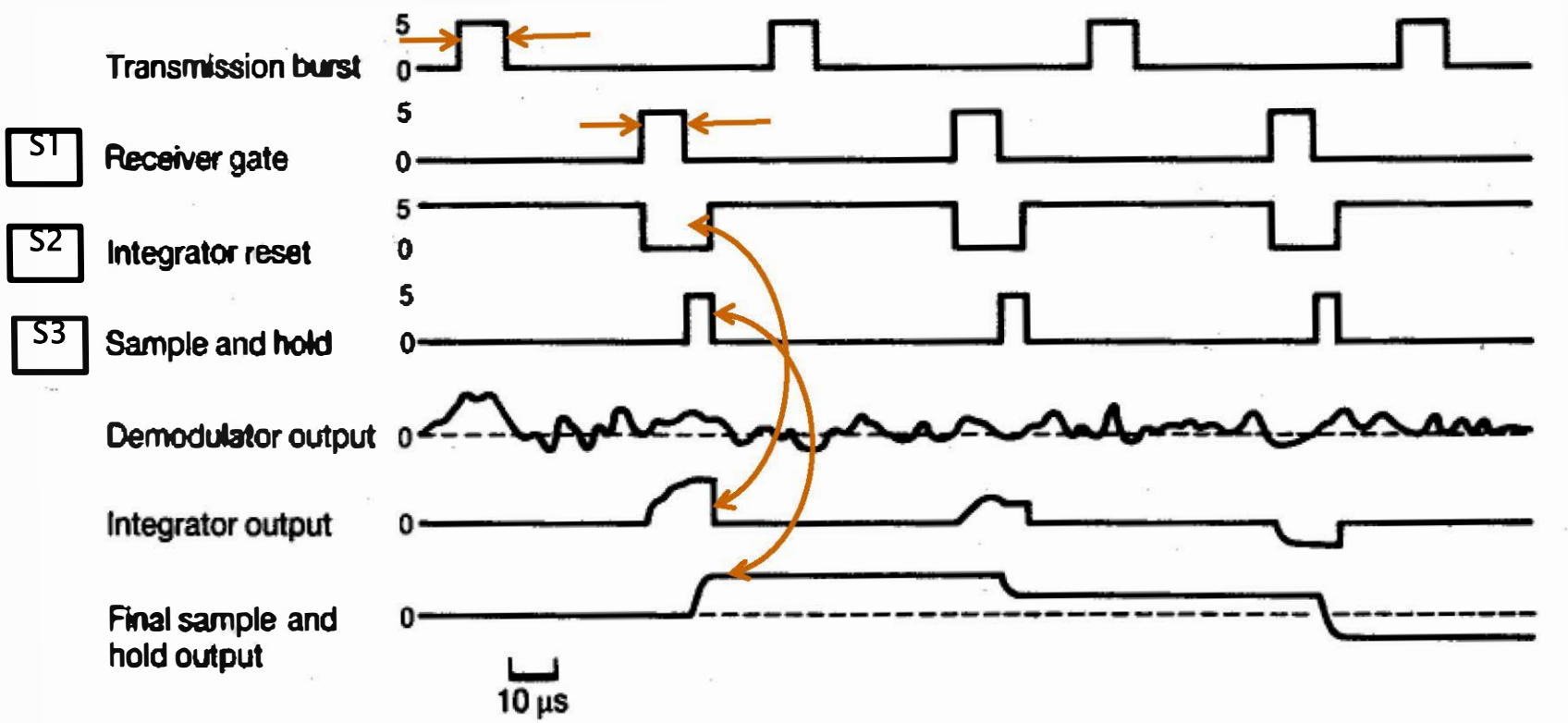
Summery: PW-Doppler Systems

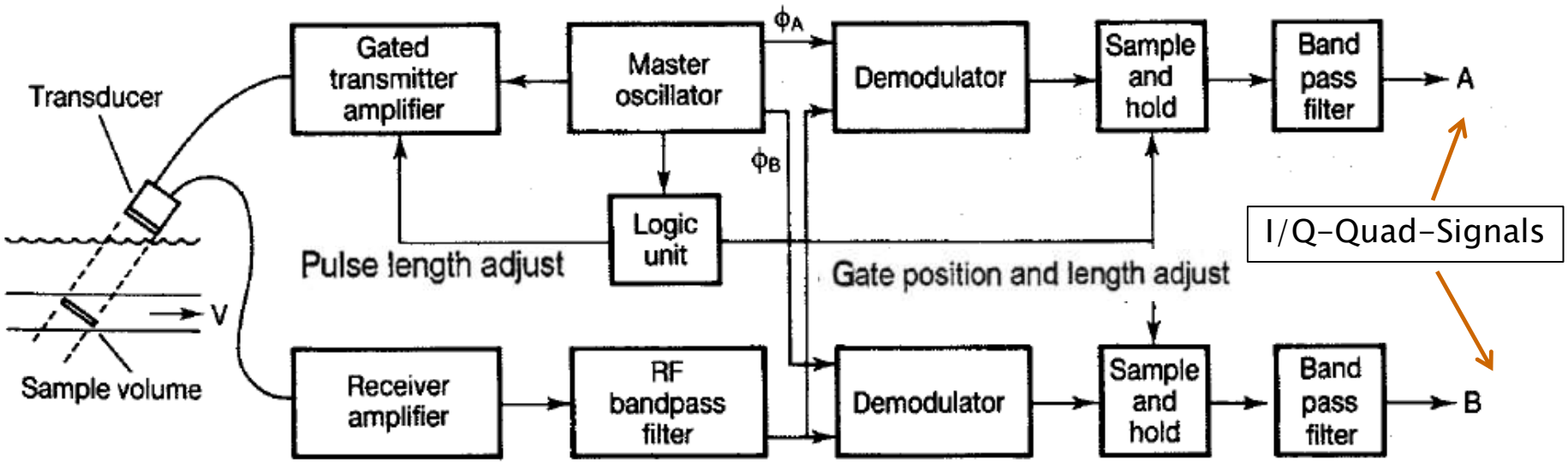
Signal detection and pre-processing in PW_Receiver with gating



Timing diagram illustrating the sequence of events during the sampling of a Doppler signal in a PW system

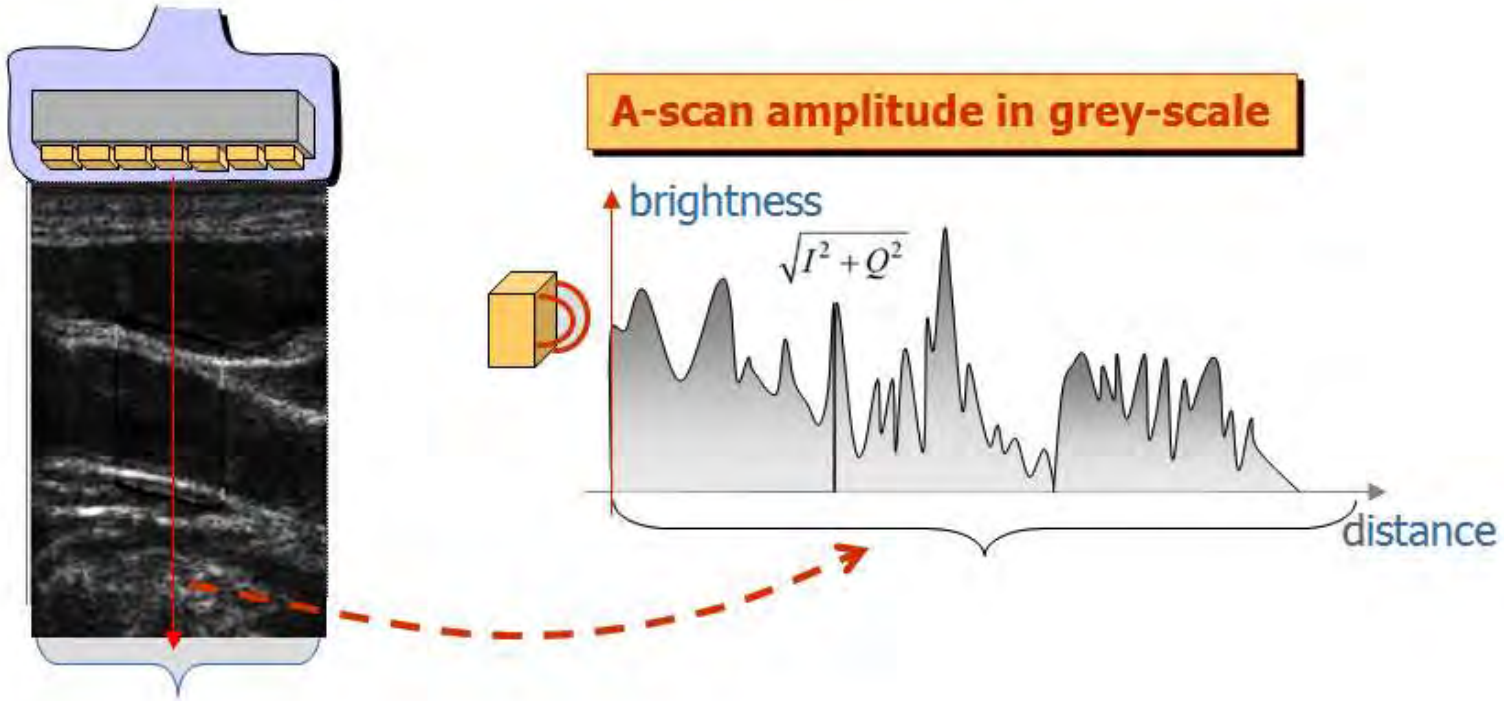
Summery: PW-Doppler Systems

Signal conditioning of Pulsed Wave System (single beam) and electronics



Block diagram of a pulsed Doppler system

Ultrasound Imager-processing: Envelope detection

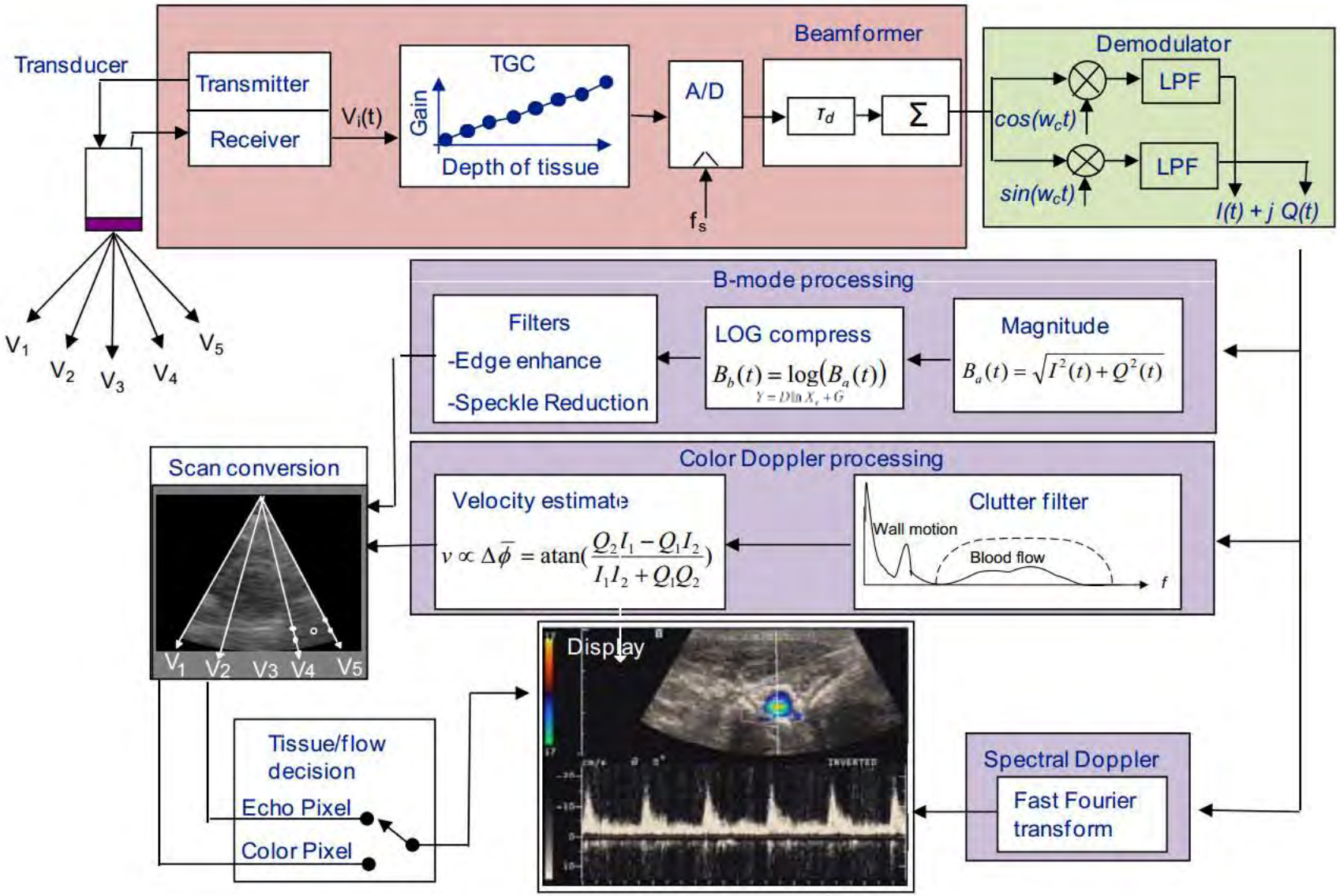


Time-Frequency-Compensation (TFC):
- Reduction of changing in center frequnecy with penetration in depth
- Attenuation is frequency dependant

Ultrasound B-Mode imaging

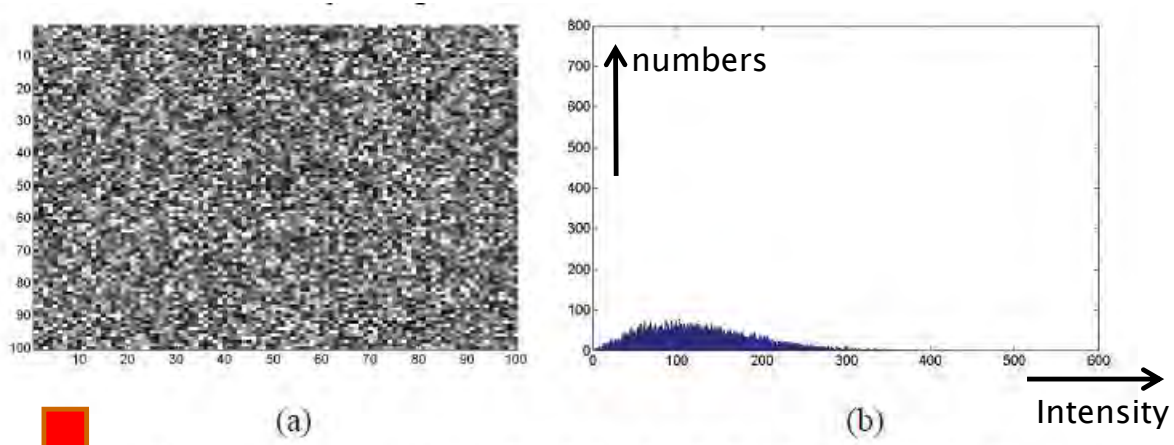
Hochschule Ulm

Conventional ultrasound signal and imaging processing



Ultraschall-Bildverfahren

B-Mode: log-compression

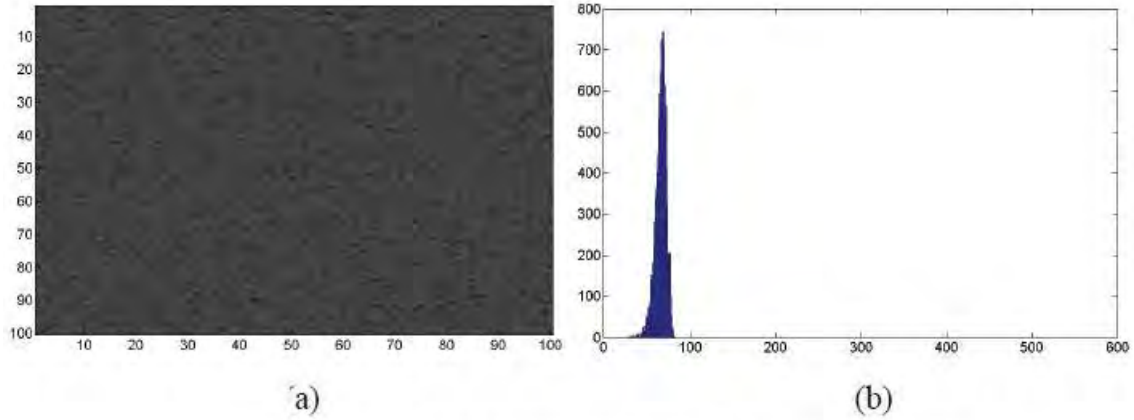


(a) *Computer generated signal with Rayleigh distribution*; (b) *Its histogram.*

$$Y = D \ln X_e + G$$

Xe: Envelope
G: Offset
D: Shape parameter

- Adapting dynamic range (D)-Parameter
- Improving S/N (G-Parameter) in picture



(a) *Signal after log-compression.* (b) *Its histogram.*

Ultraschall-Bildverfahren: Signal processing

Duplex + signal processing: Demodulation

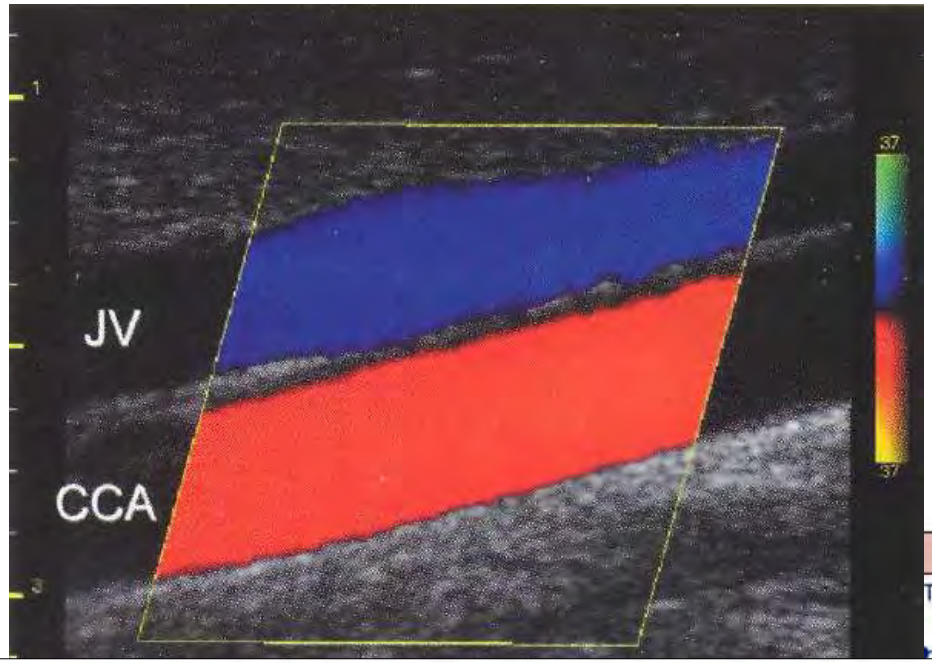
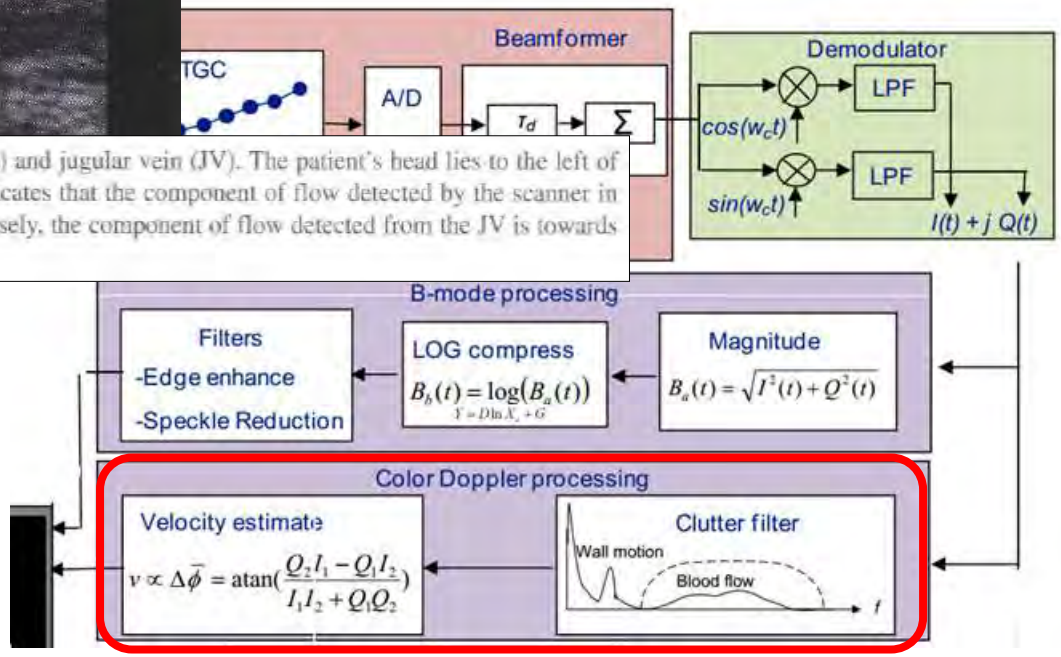


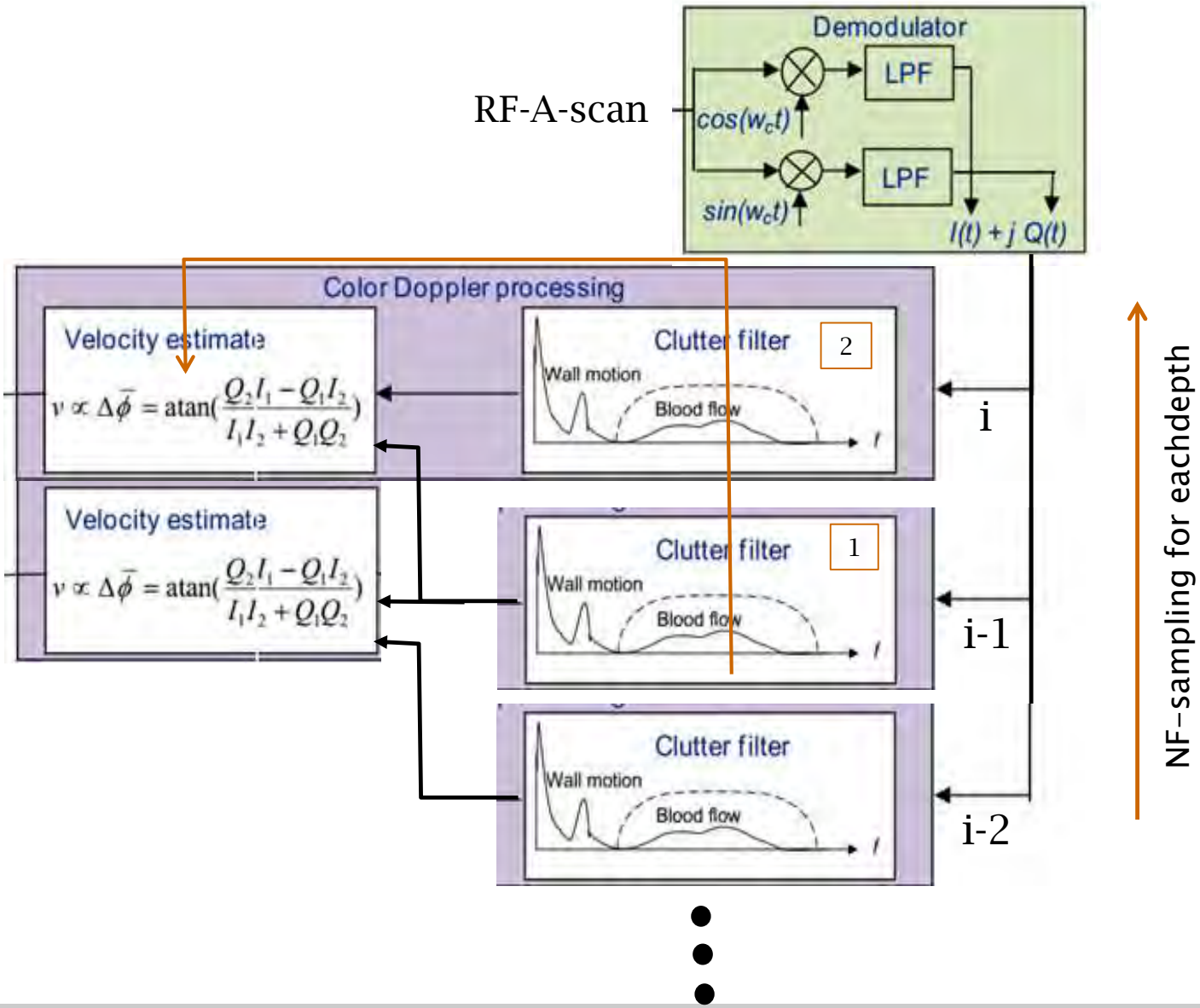
Figure Colour Doppler flow image of a common carotid artery (CCA) and jugular vein (JV). The patient's head lies to the left of the scan, his feet to the right. The colour scale on the right of the image indicates that the component of flow detected by the scanner in the CCA is away from the transducer (i.e. moving from right to left). Conversely, the component of flow detected from the JV is towards the transducer (image courtesy of GE Ultrasound)



Scan-converter
Display

Ultraschall-Bildverfahren: Signal processing

Doppler Color coded - M-Mode-line (single A-Scan runing over time)



Ultraschall-Bildverfahren: M-Mode

Echoe-Display-Mode: Fast Single A-Scan Mode

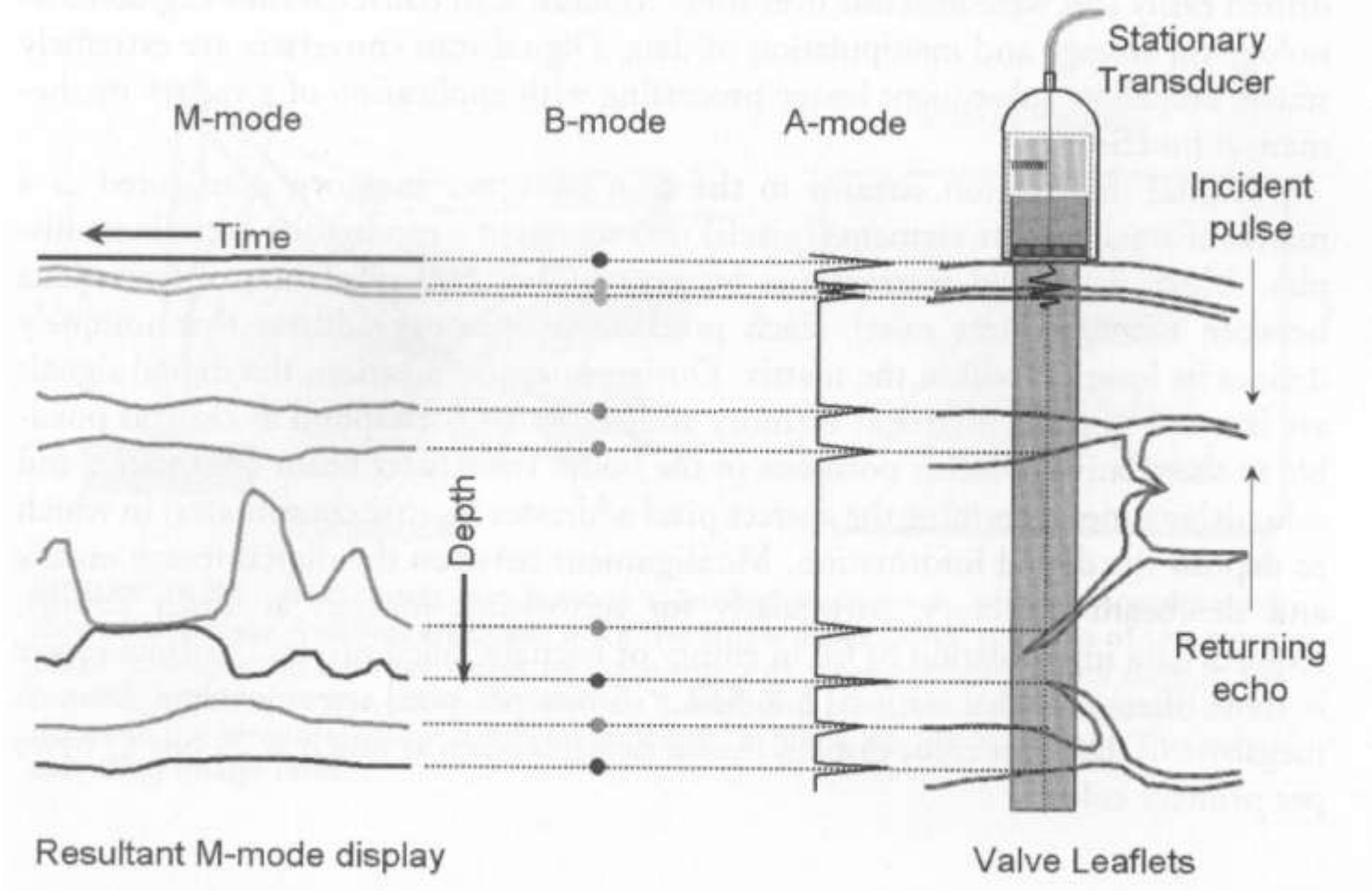


FIGURE M-mode data is acquired with a stationary transducer or transducer array. The A-mode data are brightness encoded and deflected across the horizontal direction to produce M-mode curves. M-mode display of valve leaflets is depicted.