

CS based processing for high resolution GSM passive bistatic radar

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Echo signal

Adaptive filtering

direct signal

Passive Bistatic Radar

Monostatic radars

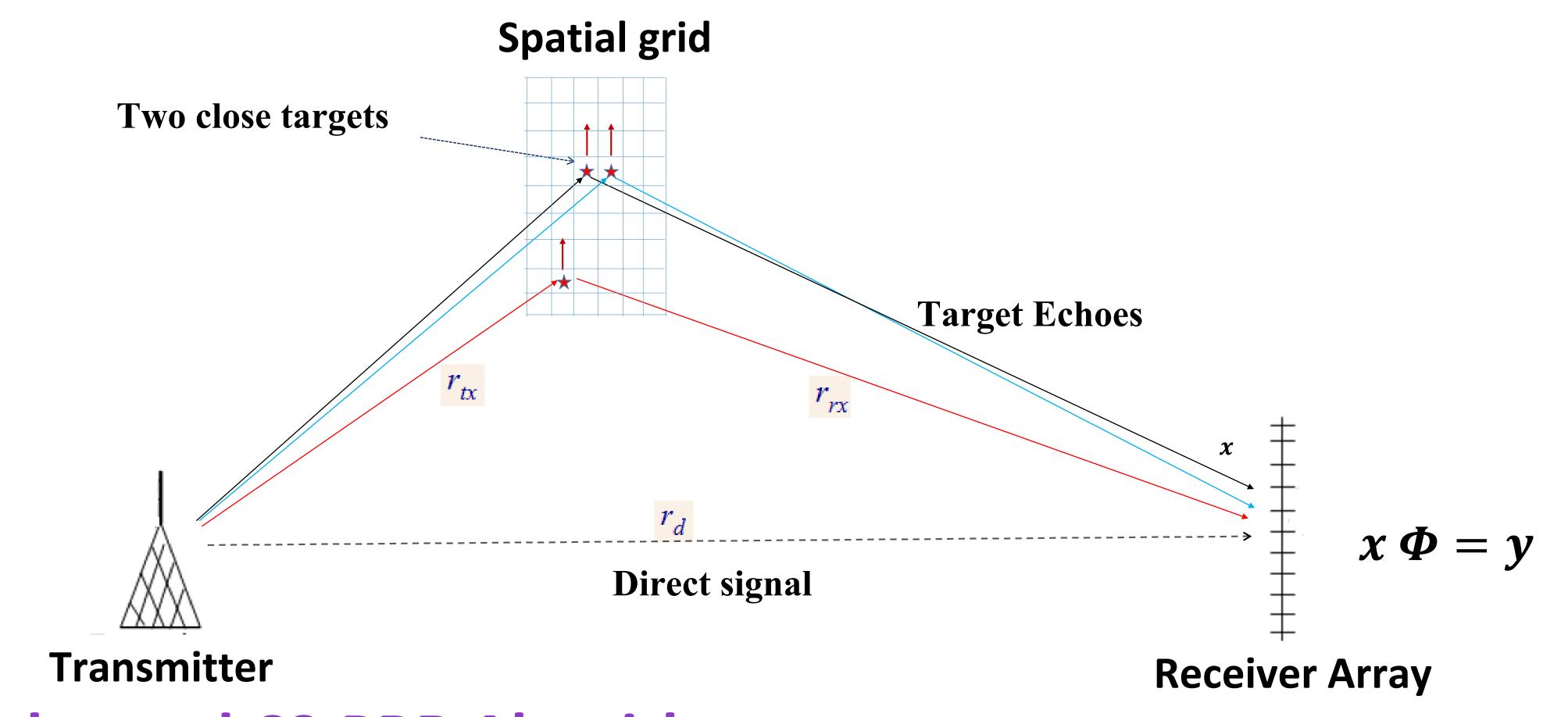
- √ Single-site operation
- ✓ Controlled transmission

Limitations

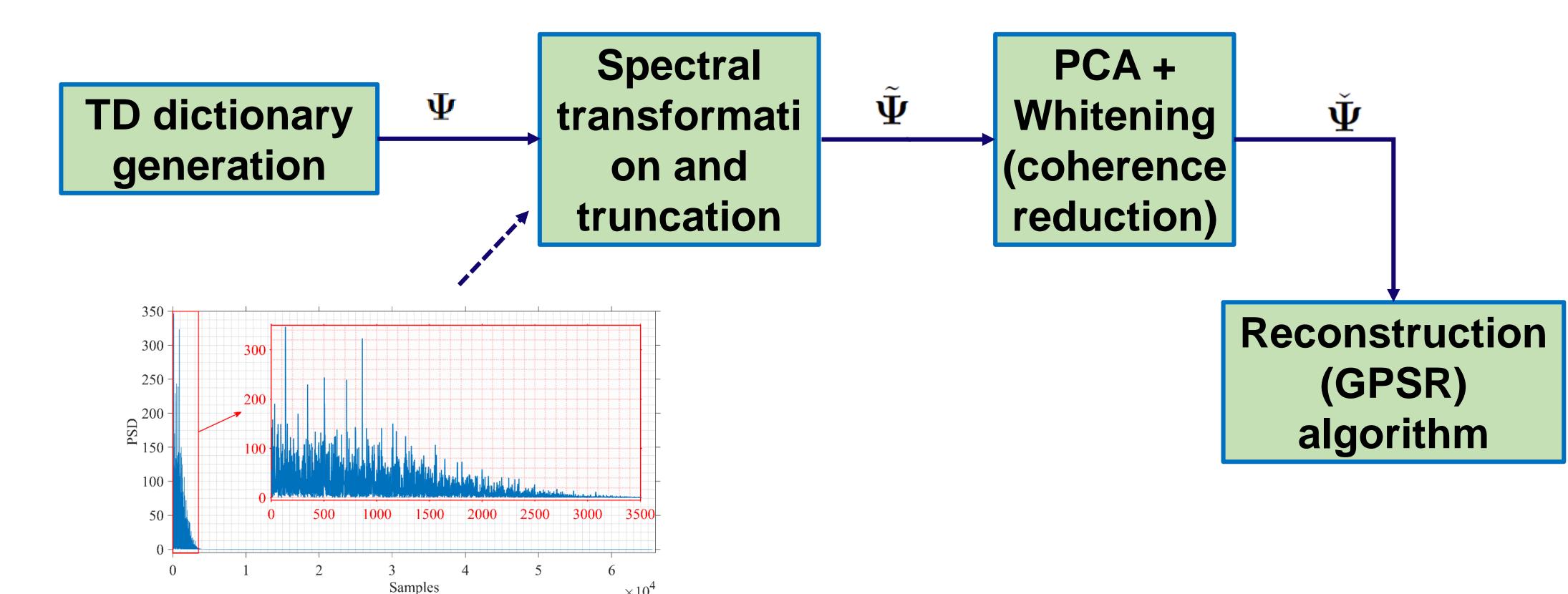
- Non-covert system
- **X** Jamming, Interception and ECM
- ***** Anti-Radiation Missile
- Stealthy targets
- Expensive

Anti-Radiation Missile Jammer Mono-static Radar

CS-PBR Measurement



PCA-enhanced CS-PBR Algorithm



Open Issues:

Off-grid mismatch, Appropriate clutter model, Target tracking

Classical PBR Limitations: CS Applicability

Parameters	GSM			Received
Frequency band (MHz)	935-960			Array data
Channel BW	200 kHz		Г	
Typical ERP (kW)	0.5 – 1		ţa	Transmitter
Range resolution (△R)	~ 1.854 km		ichannel Data	DOA
Doppler resolution (Δv)	T = 0.2 s		hann	i
	$\Delta v = 1 m/s$		Multic	Tx DO
			Σ	
	Blocks replaced by	CS process		Digital
	Target	Cross-	Direct signal	Beamforming

Ambiguity

function

plotting

High-resolution Results for GSM-PBR

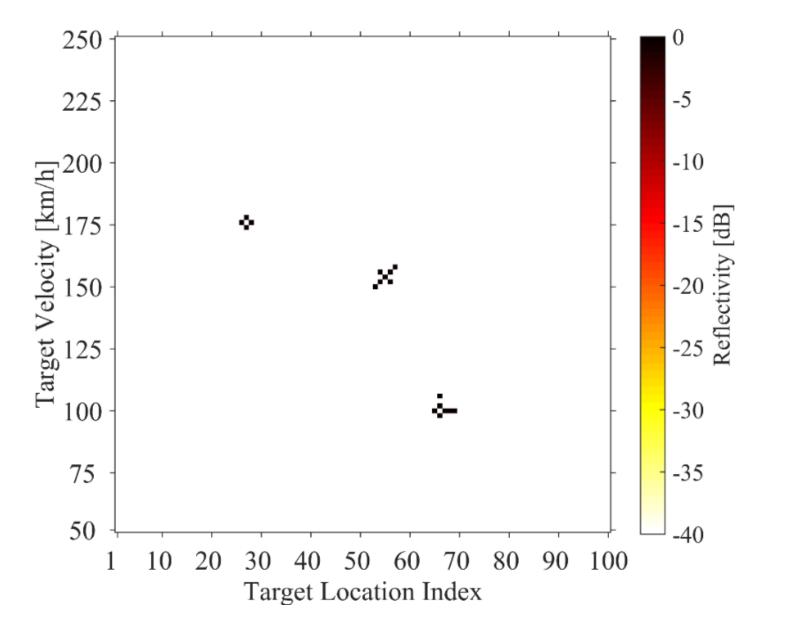
Target space: 3km x 3km; $\Delta R = 300 \text{ m}$; $\Delta v = 2 \text{ km/hr} (\sim 0.56 \text{ m/s})$;

Detection

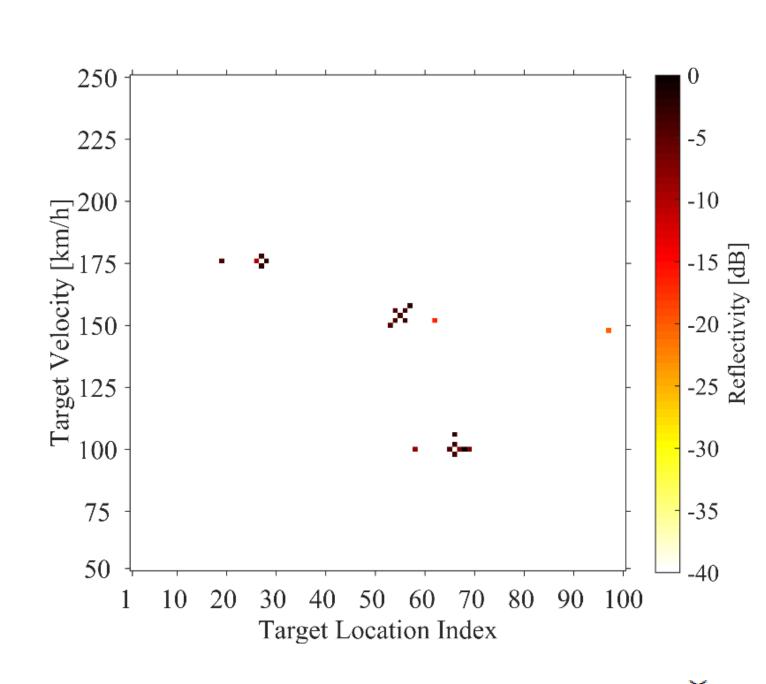
and

Tracking

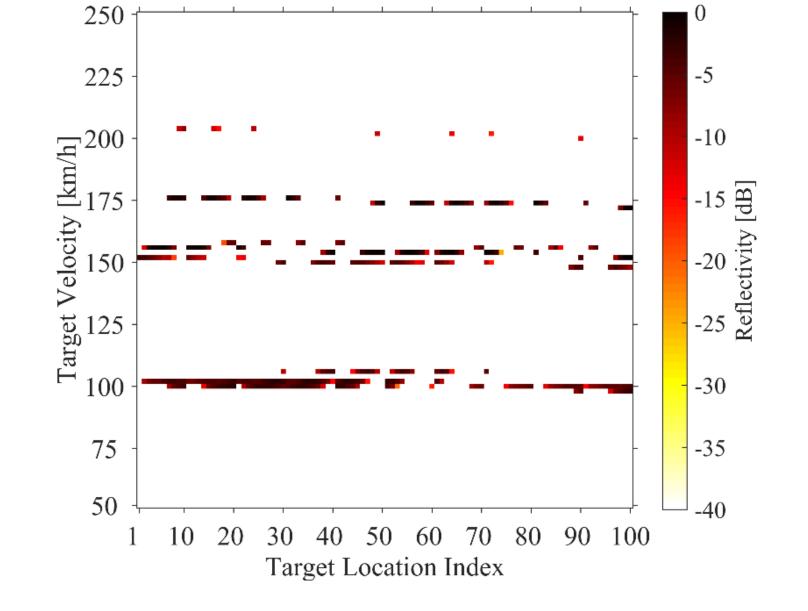
Observation time = 0.6554 s



Original target scenario

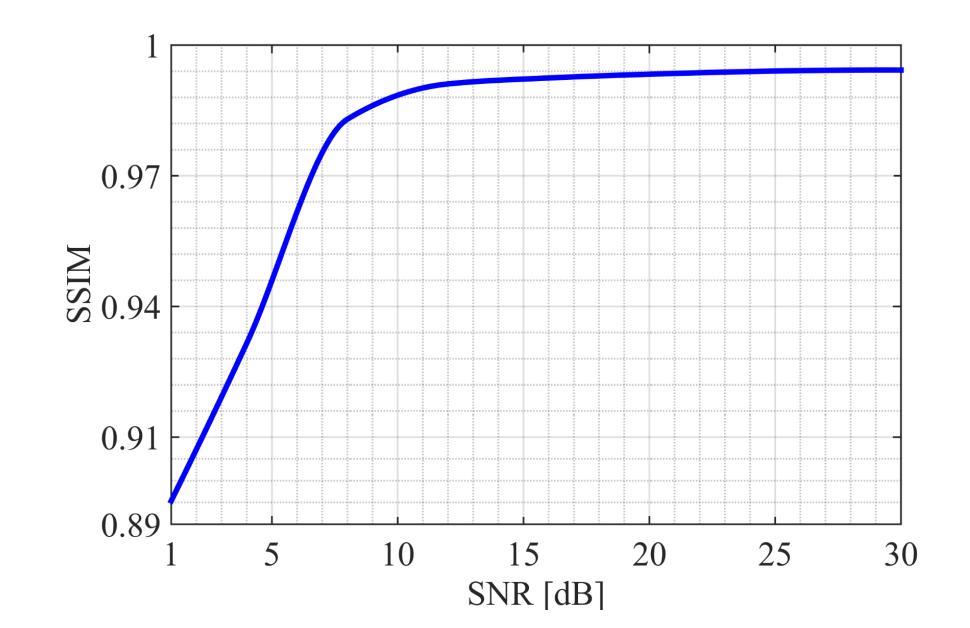


Reconstruction using $\check{\Psi}$



Clean Echo

Reconstruction using $\tilde{\Psi}$



Structural similarity index vs. SNR values