



UltraGS

Real-Time Physically-Decoupled Gaussian Splatting for Ultrasound Novel View Synthesis



29.55 PSNR 0.8966 SSIM 64.69 FPS

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 ICME 2026 | Sensorless B-mode ultrasound | github.com/Bean-Young/UltraGS

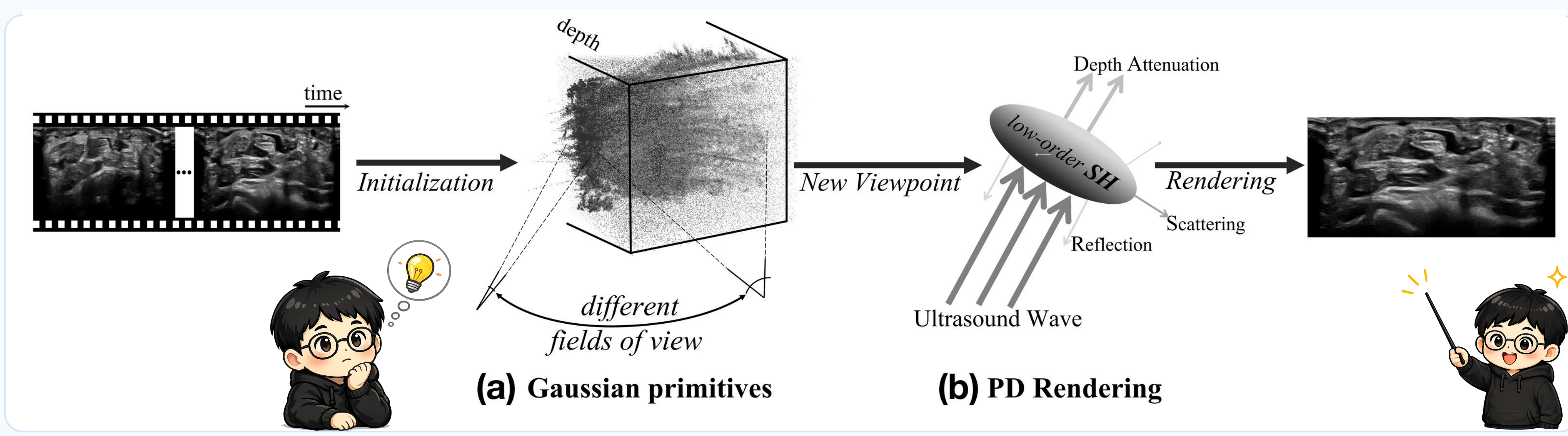
A Abstract

Sensorless ultrasound NVS with explicit splatting and acoustic priors.

H Highlights

- 2D Gaussian disks for acoustic geometry.
- DAR corrects freehand FoV drift.
- PD Rendering models wave effects.
- Clinical wrist and kidney scans.
- SOTA quality at real-time speed.

M Pipeline

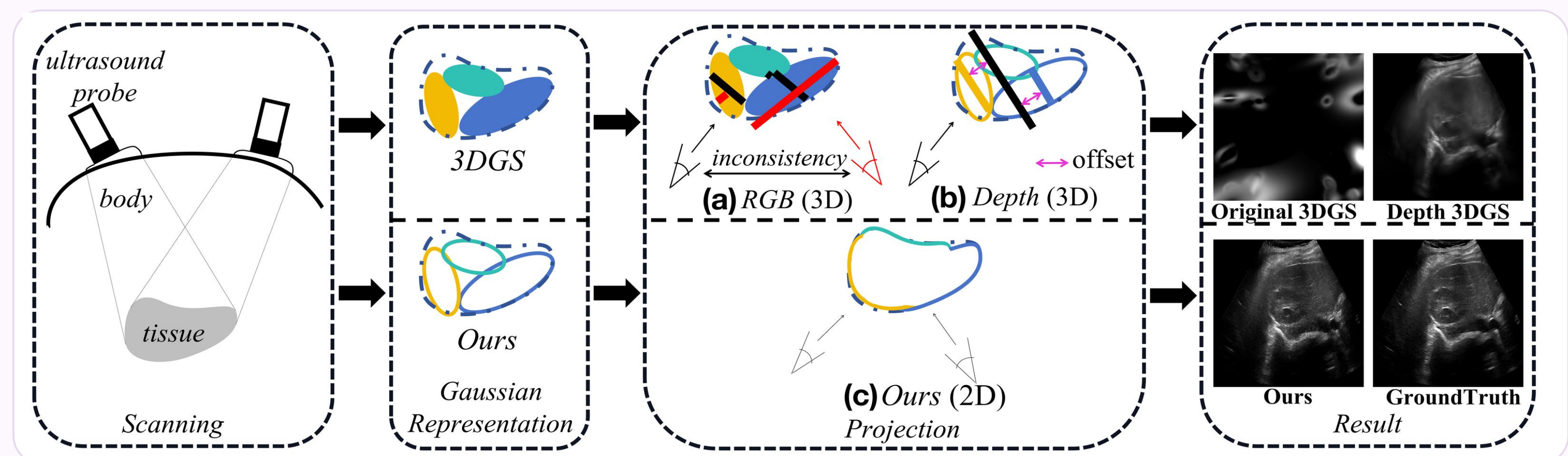


- Sensorless**: No external tracker.
- DAR**: Corrects FoV drift.
- PD Render**: Models wave effects.
- Realtime**: 64.69 fps.

M Method Details

2D Gaussian Disks
 Align with tissue-probe planes. Reduce acoustic depth offsets.

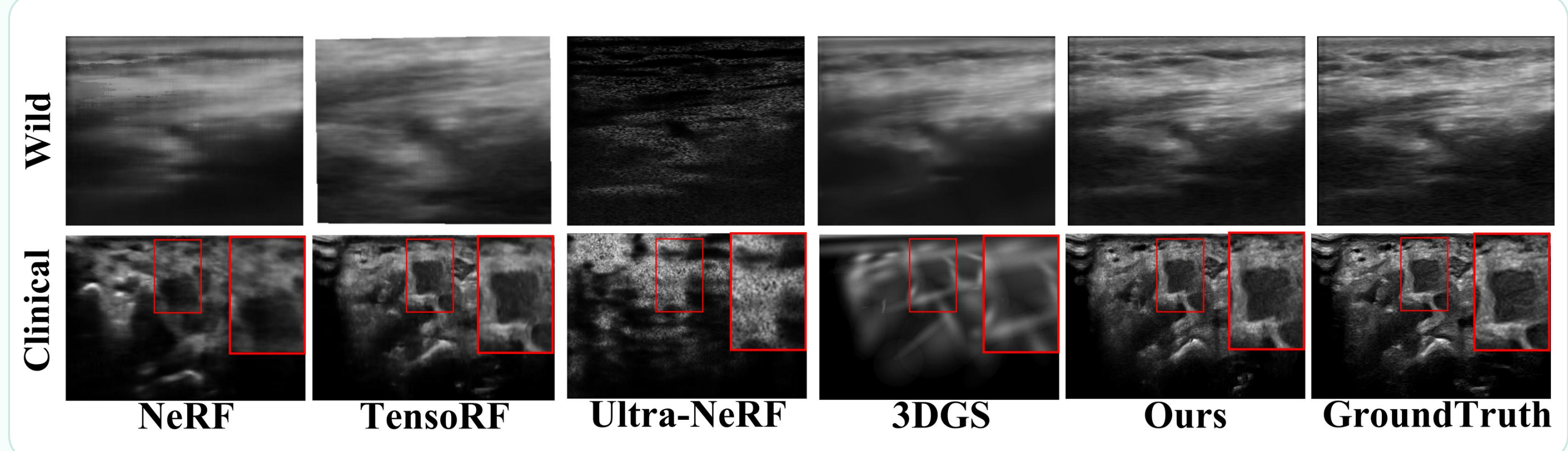
PD Rendering
 Low-order SH + first-order wave effects. Fast and stable.



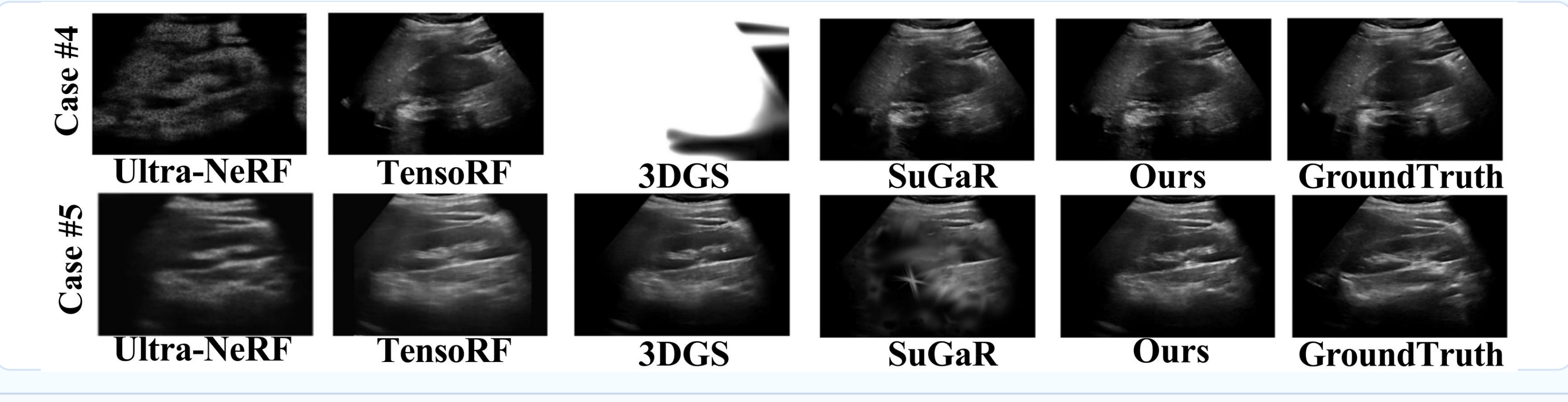
R Quantitative Results

Method	Wild PSNR	Phantom PSNR	Speed
NeRF	20.176	20.359	0.28
3DGS	22.327	27.115	52.56
SuGaR	21.392	28.899	9.81
Ours	25.454	29.550	64.69

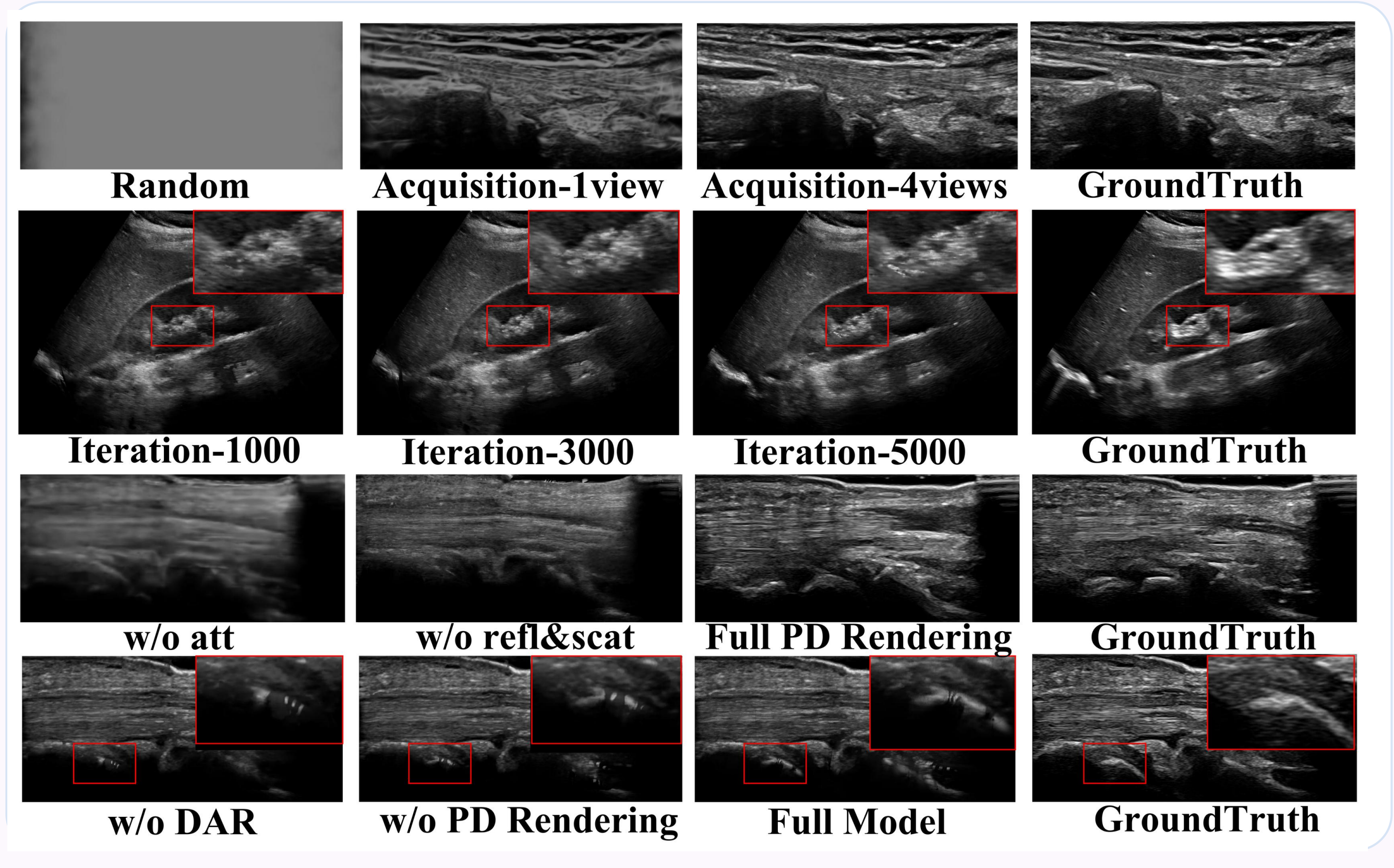
R Visual Evidence



R Clinical Kidney



R Ablation



C Conclusion

UltraGS achieves real-time sensorless ultrasound NVS by integrating acoustic-aware Gaussian geometry, dynamic aperture rectification, and physically-decoupled rendering.

Full Paper

GitHub Repo

Project Page

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