



THE 17 TH IEEE CONFERENCE ON
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Facial Geometric Detail Recovery via Implicit Representation

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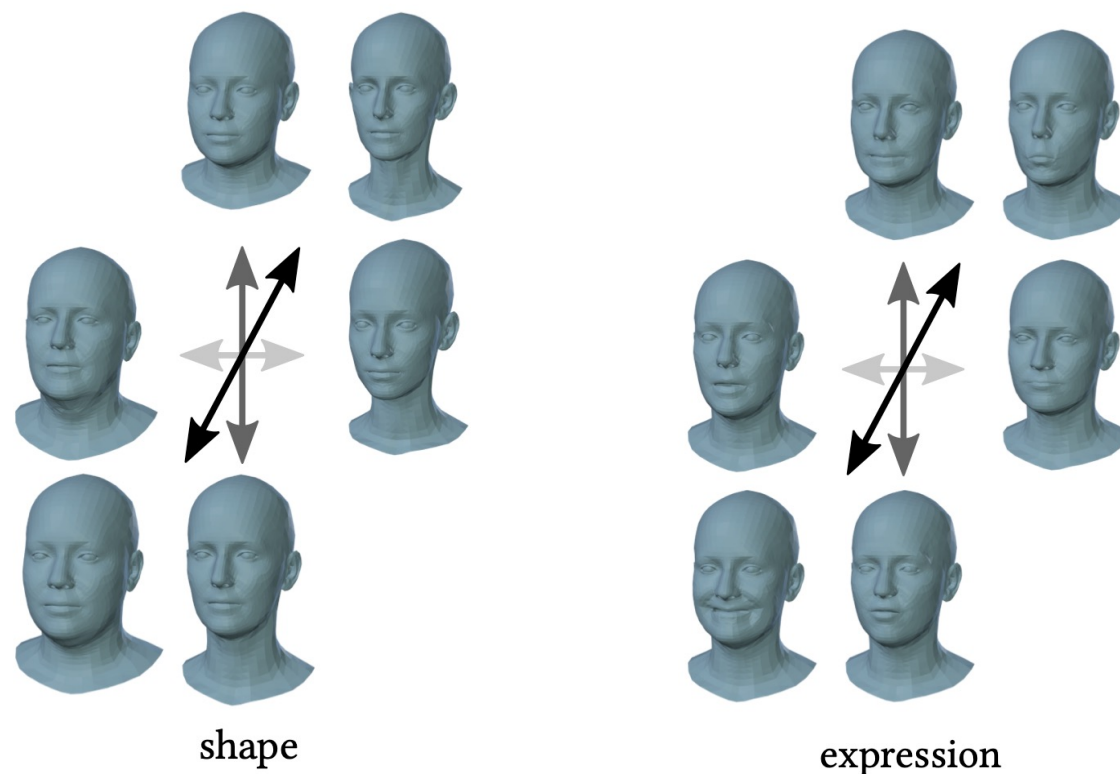


HUAWEI



Background

3D Face Reconstruction



Applications:

- Face Recognition
- Manipulation
- Facial animation
- ...



Previous Work

Training Data:

- High-fidelity 3D scans
- Multi-view images
- In-the-wild images

Details Representation:

- Vertices movements
- Bump maps
- Normal maps
- Displacement maps



Goal

3D Face Details Recovery from Single Image

Training Data:

- High-fidelity 3D scans
- Multi-view images
- In-the-wild images
- *Single real image*

Details Representation:

- Vertices movements
- Bump maps
- Normal maps
- Displacement maps
- *Implicit Signed Distance Function*



Insights

Implicit surfaces contain flexible resolutions and meaningful geometric details.



Input Image



Implicit Representation
*(Texture Completion,
Pseudo-multi-view optimization)*

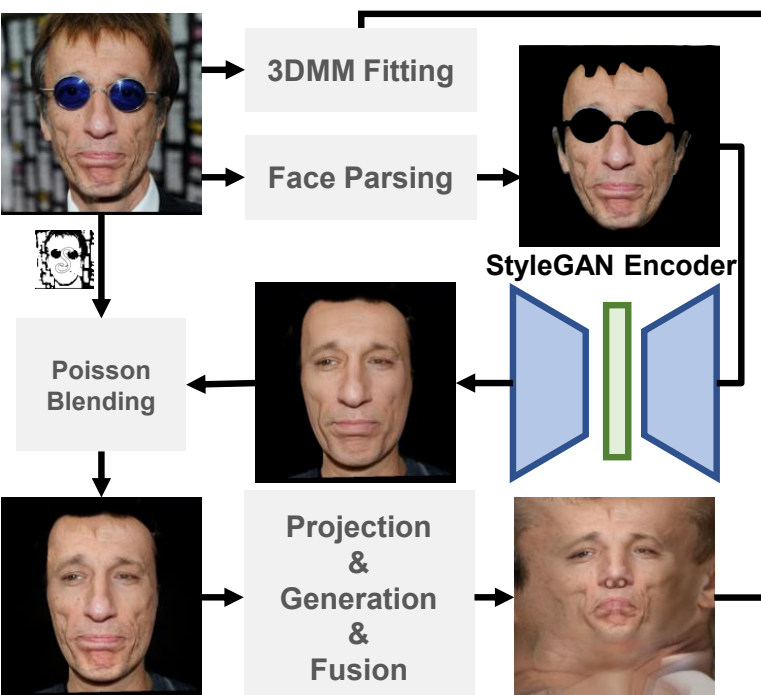


Detailed Mesh

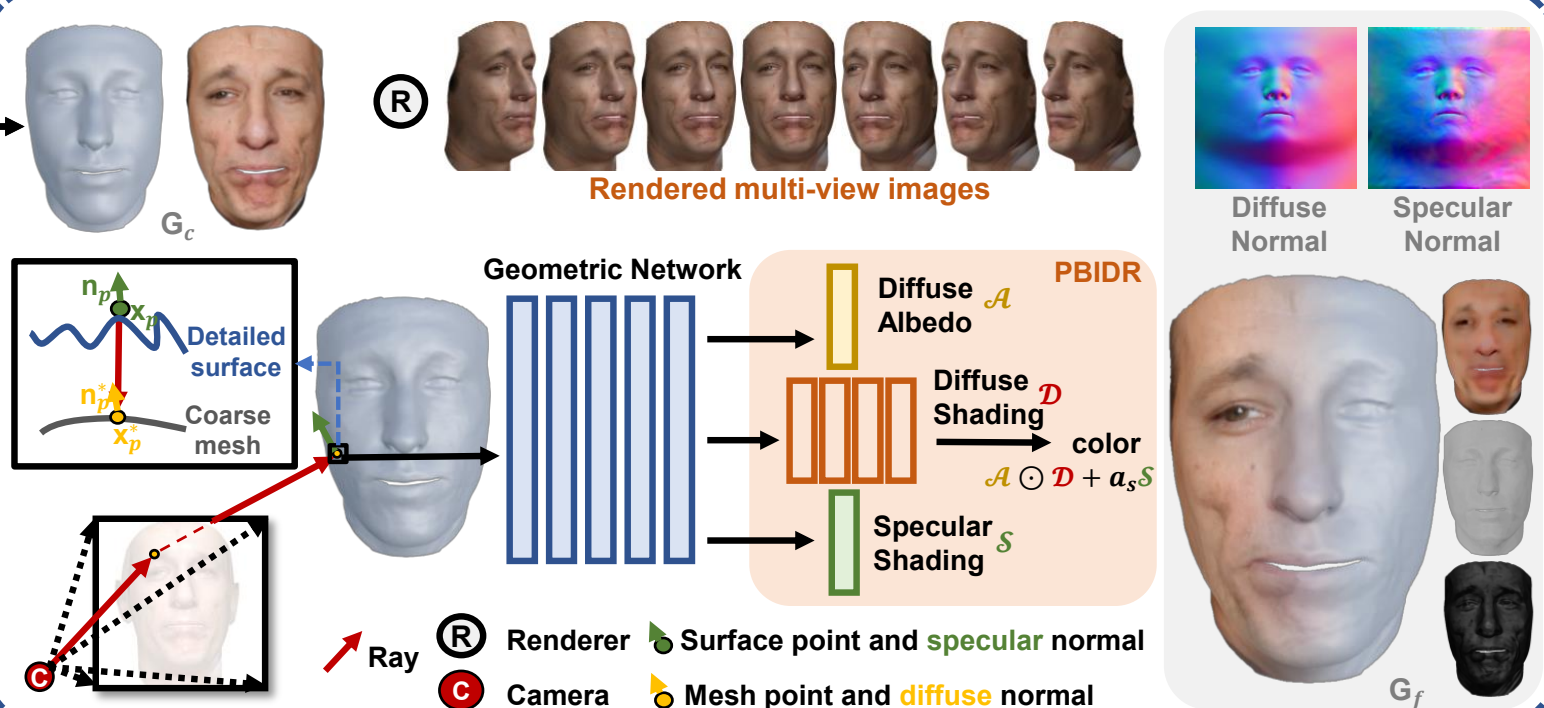


Our Method: PBIDR

Occlusion-Robust Texture Completion

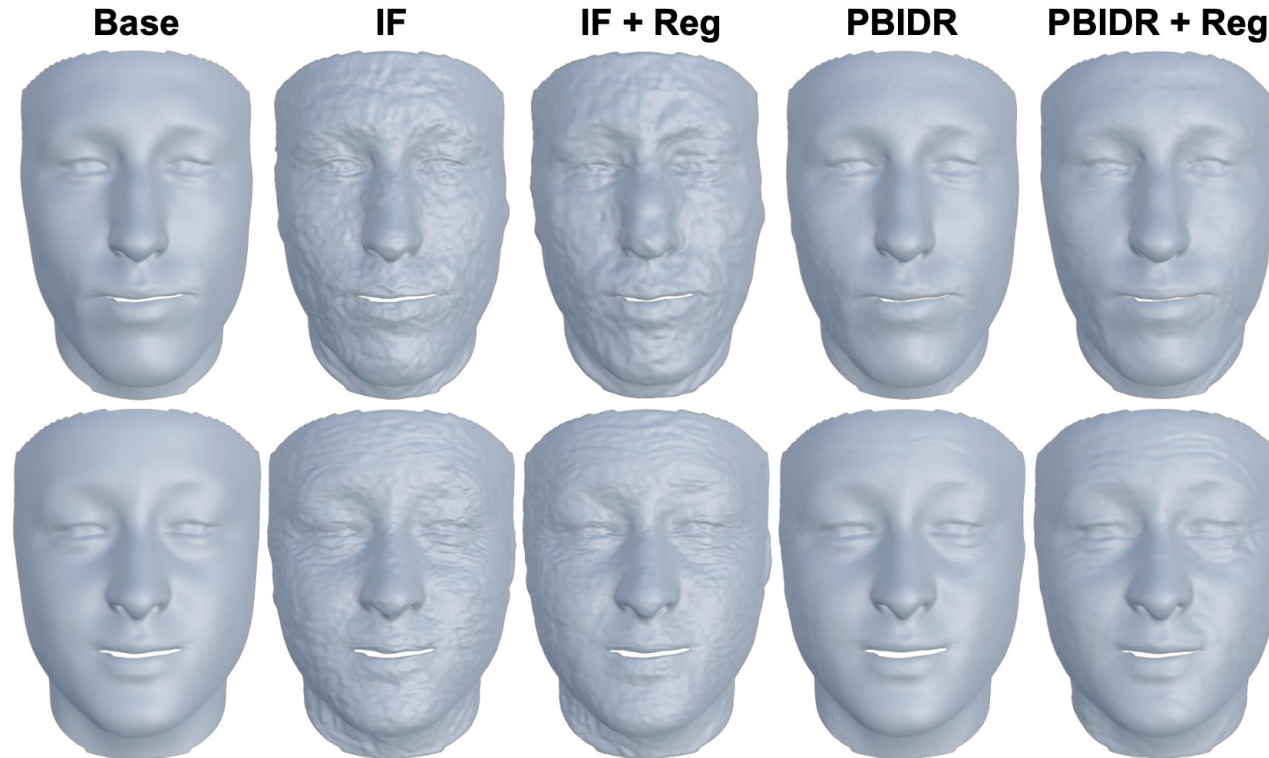


Texture-guided Facial Geometric Detail Recovery



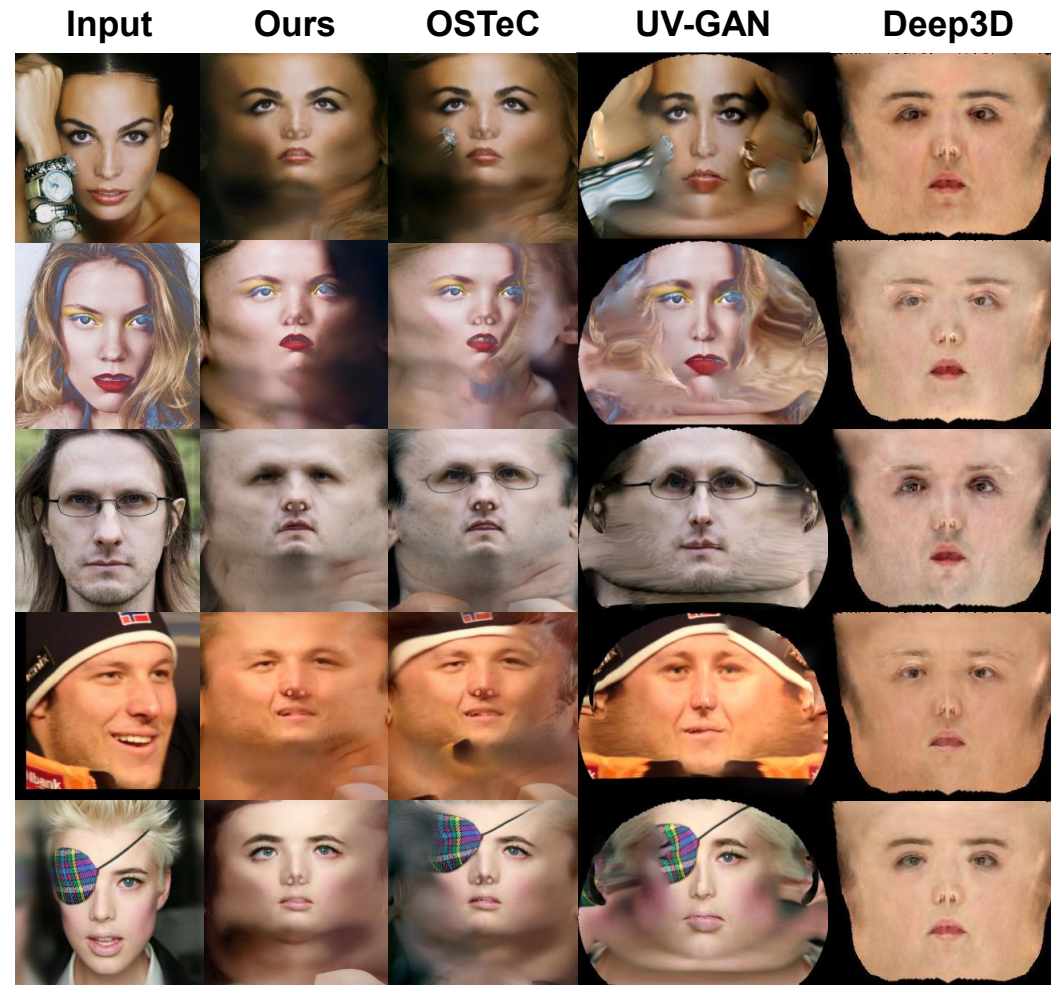


Ablation: PBIDR



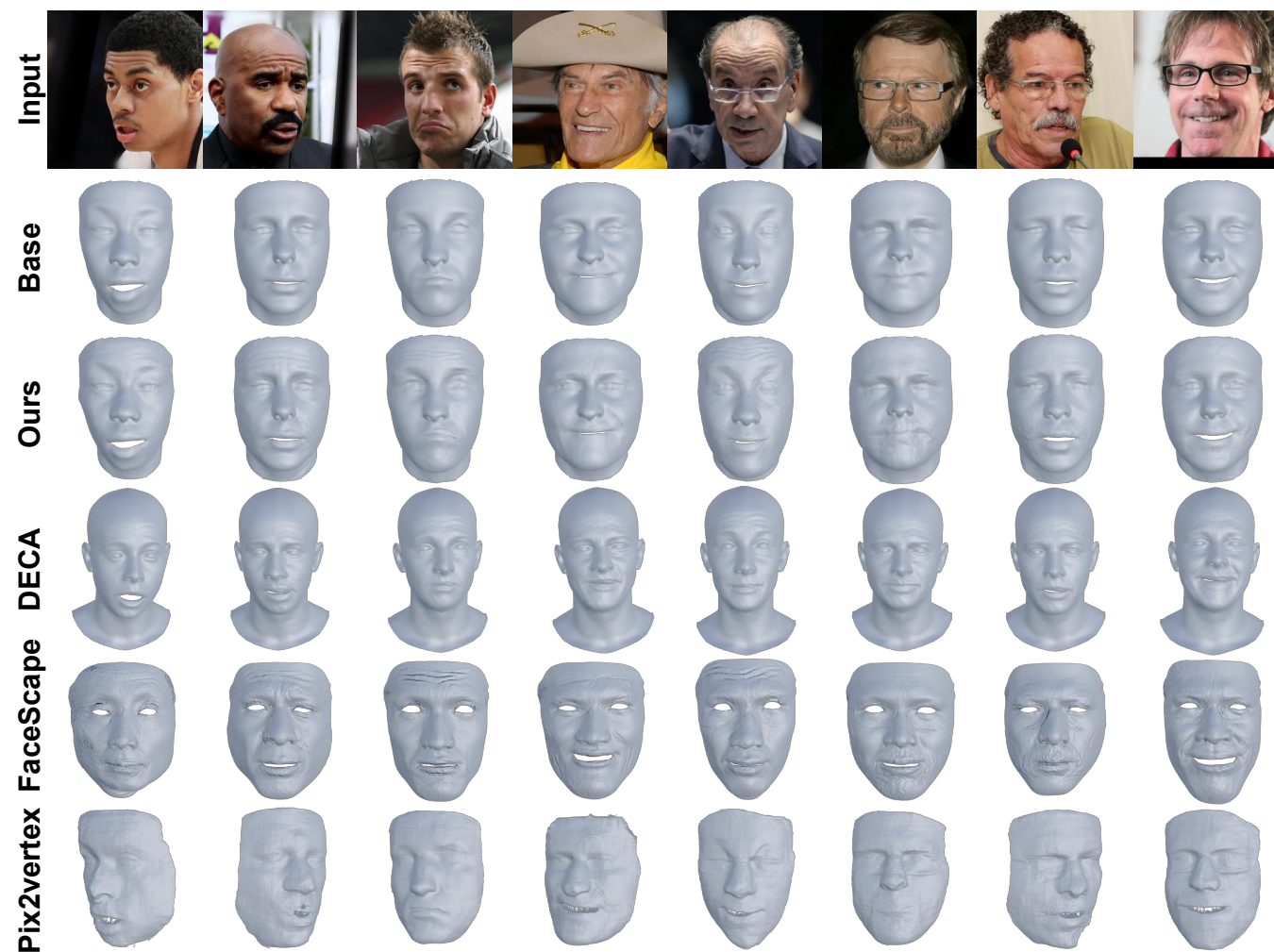


Results: Texture Completion



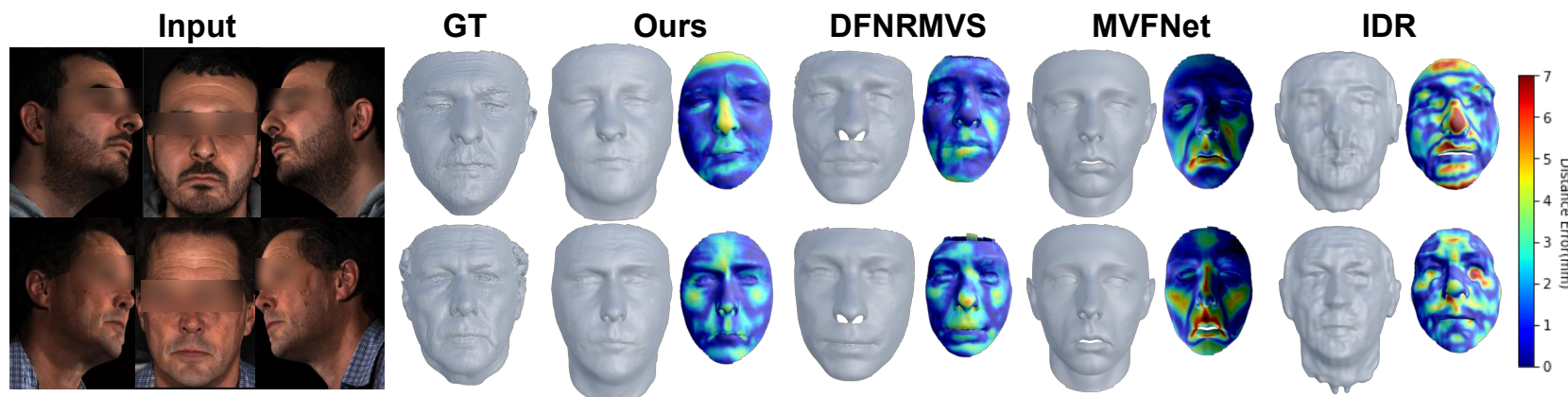


Results: Details Recovery





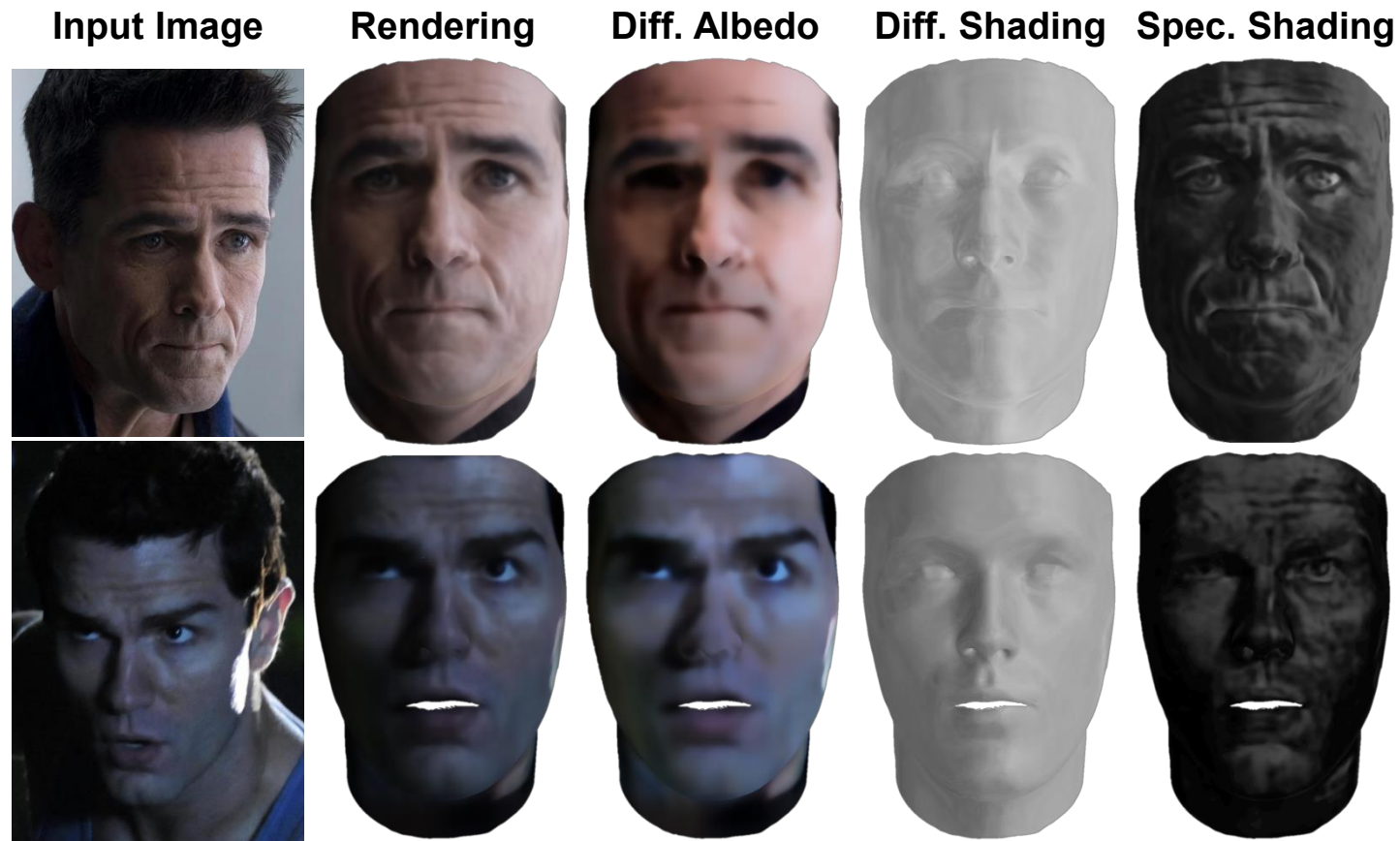
Results: Details Recovery



Method	3DFAW	MICC	UC. Distance	UC. Normal
MVFNet [65]	2.27 ± 0.54	1.34 ± 0.29	1.53 ± 0.56	0.094
DFNRMVS [5]	2.26 ± 0.53	1.32 ± 0.28	1.15 ± 0.41	0.087
IDR [67]	6.48 ± 2.83	4.18 ± 1.35	2.84 ± 1.32	0.131
Base [20]	2.06 ± 0.44	1.23 ± 0.22	1.22 ± 0.45	0.088
Ours	2.02 ± 0.42	1.19 ± 0.21	1.20 ± 0.43	0.069



Results: Self-supervised decomposition





More Visualization Results

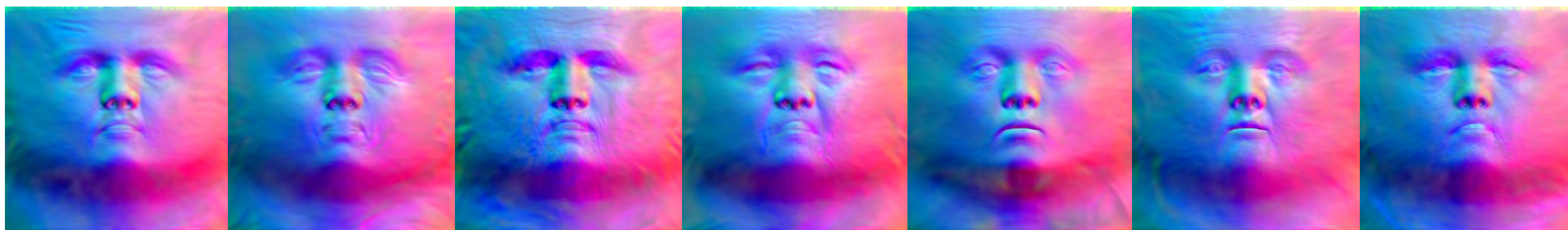
Input



Reconstruction



NormalMap

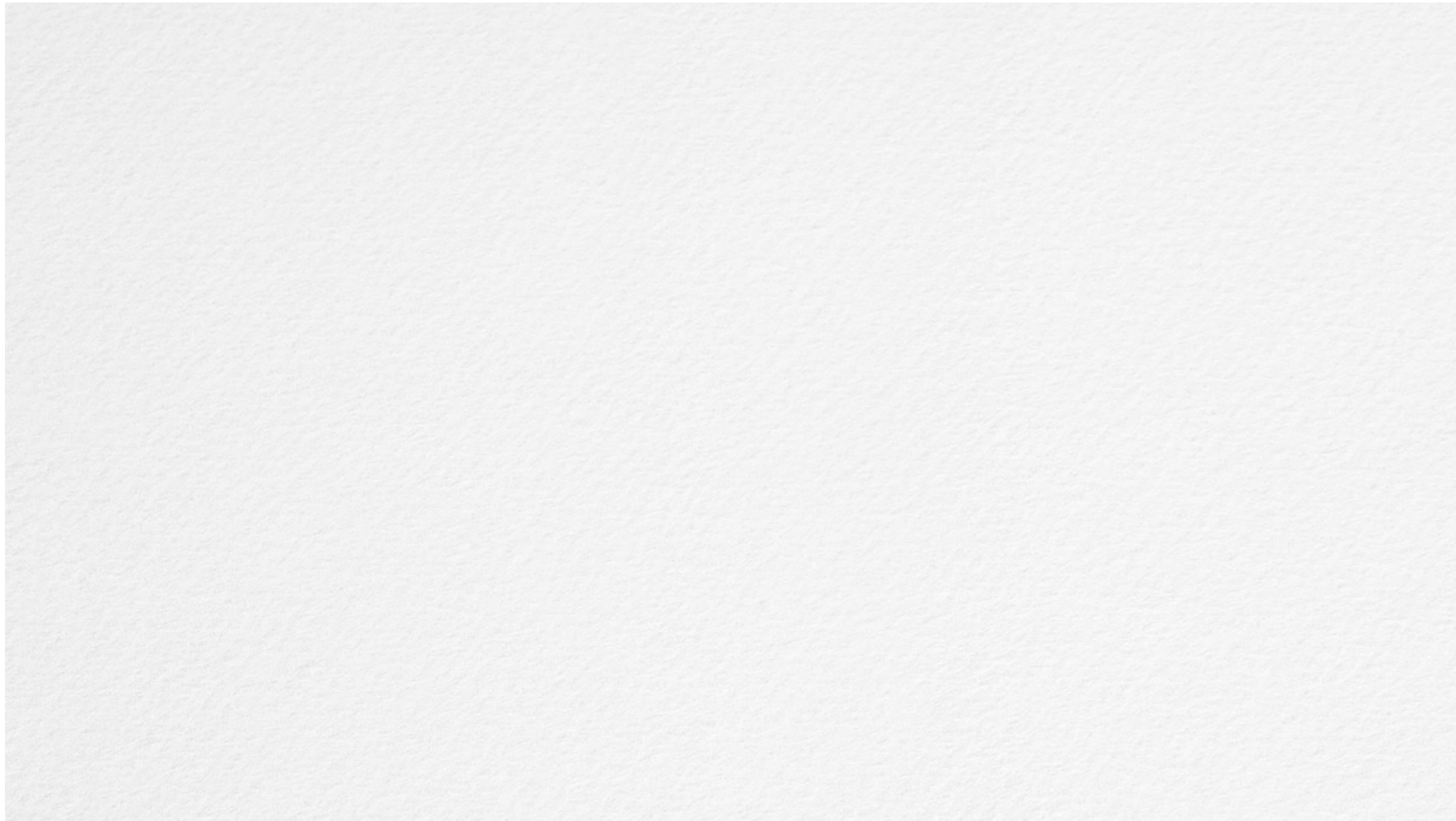




More Visualization Results



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Conclusion: Methodology

- A novel method for facial details recovery, **without requiring vast facial images or 3D scans.**
- **Physically-based implicit differentiable rendering function** for precise details recovery.



Thanks for listening!

More Information

- Paper
- Source Code

