SVG-Head: Hybrid Surface-Volumetric Gaussians for High-Fidelity Head Reconstruction and Real-Time Editing
– – Supplementary Material – –

A. Comparison with HAHA

As discussed in the main paper, a strong surface Gaussian reconstruction in the first stage is essential for the subsequent volumetric refinement, particularly in modeling non-Lambertian details such as lips and hair. To validate this, we compare our method with HAHA [1], a recent approach that combines mesh-based representations with Gaussian models.

We adapt the publicly available HAHA implementation[1] to run on the NeRSemble dataset and conduct a controlled evaluation on subject 306. As shown in Fig. 1, HAHA struggles to capture high-fidelity geometry and suffers from significant rendering artifacts, particularly around the hairline and facial boundaries. In contrast, our method benefits from a mesh-aware surface Gaussian representation and hierarchical optimization, which leads to sharper texture reconstruction and more accurate representation of challenging regions.

These results support our hypothesis that a strong initialization from the first stage enables effective volumetric refinement in the second stage, resulting in high-quality residual modeling.

Figure 1. Qualitative comparison between HAHA [1] and our method on NeRSemble subject 306. Our method achieves better geometry alignment and clearer representation in non-Lambertian regions.

[1] https://github.com/david-svitov/HAHA

References

[1] David Svitov, Pietro Morerio, Lourdes Agapito, and Alessio Del Bue. HAHA: highly articulated gaussian human avatars with textured mesh prior. In *Computer Vision - ACCV 2024 - 17th Asian Conference on Computer Vision, Hanoi, Vietnam, December 8-12, 2024, Proceedings, Part IX*, pages 105–122. Springer, 2024. 1