Implicit Conversion of Manifold B-Rep Solids by Neural Halfspace Representation — Supplemental Material

HAO-XIANG GUO, Tsinghua University, P .R .China
YANG LIU, Microsoft Research Asia, P. R. China
HAO PAN, Microsoft Research Asia, P. R. China
BAINING GUO, Microsoft Research Asia, P. R. China

1 QUALITATIVE EVALUATION

In Figs. 2 and 3, we provide the histogram of each metric on the benchmark dataset for all methods. These charts show that our method has comparable CD, HD and NAE distributions to SPR and IGR, and contains much fewer worse results. On FCD, FAE and IoU metrics, our approach performs best. As explained in the main paper, the use of Boolean operations makes our method worse than IGR in approximating SDF but still much better than SIREN.

We also analyze the worse results of our method, and find that the high errors mainly come from two issues. The first issue is incorrect isosurfacing in extremely narrow and thin regions, where the intersection computation becomes unstable. Fig. 1-top demonstrates this issue. Increasing the isosurfacing level to a higher resolution can solve this issue in most cases. The second issue is that our default sampling strategy may not sample enough points within a narrow region for training. As a result, the network cannot distinguish between the inside and outside of the model. Fig. 1-bottom demonstrates an example. As local sample points are generated by perturbing surface points with a normal distribution with standard variation σ. By reducing σ to $\frac{\sigma}{10}$, more points can be sampled within the model, and the problem can be solved.

2 MORE CONVERSION RESULTS

In Fig. 4 and Fig. 5, we provide more extracted zero surfaces of the conversion results from our benchmark data. The models in the GT column are the input B-Rep models, and we render them using the accompanying mesh models and highlight the sharp feature curves in black.

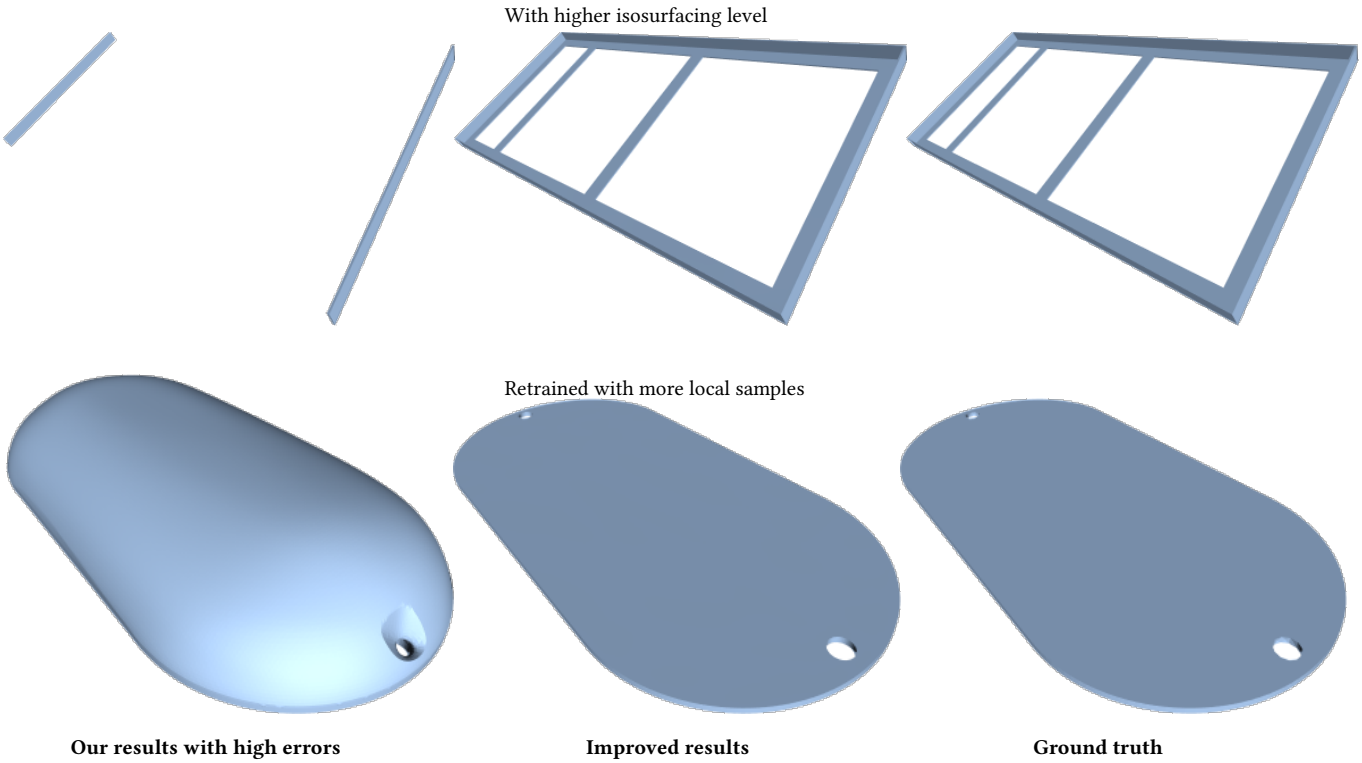

Fig. 1. **Left**: Models with high errors. **Middle**: By increasing the isosurfacing level from 256^3 to 512^3, or shrinking the range of local sample, the issues can be solved. **Right**: Ground truth models.

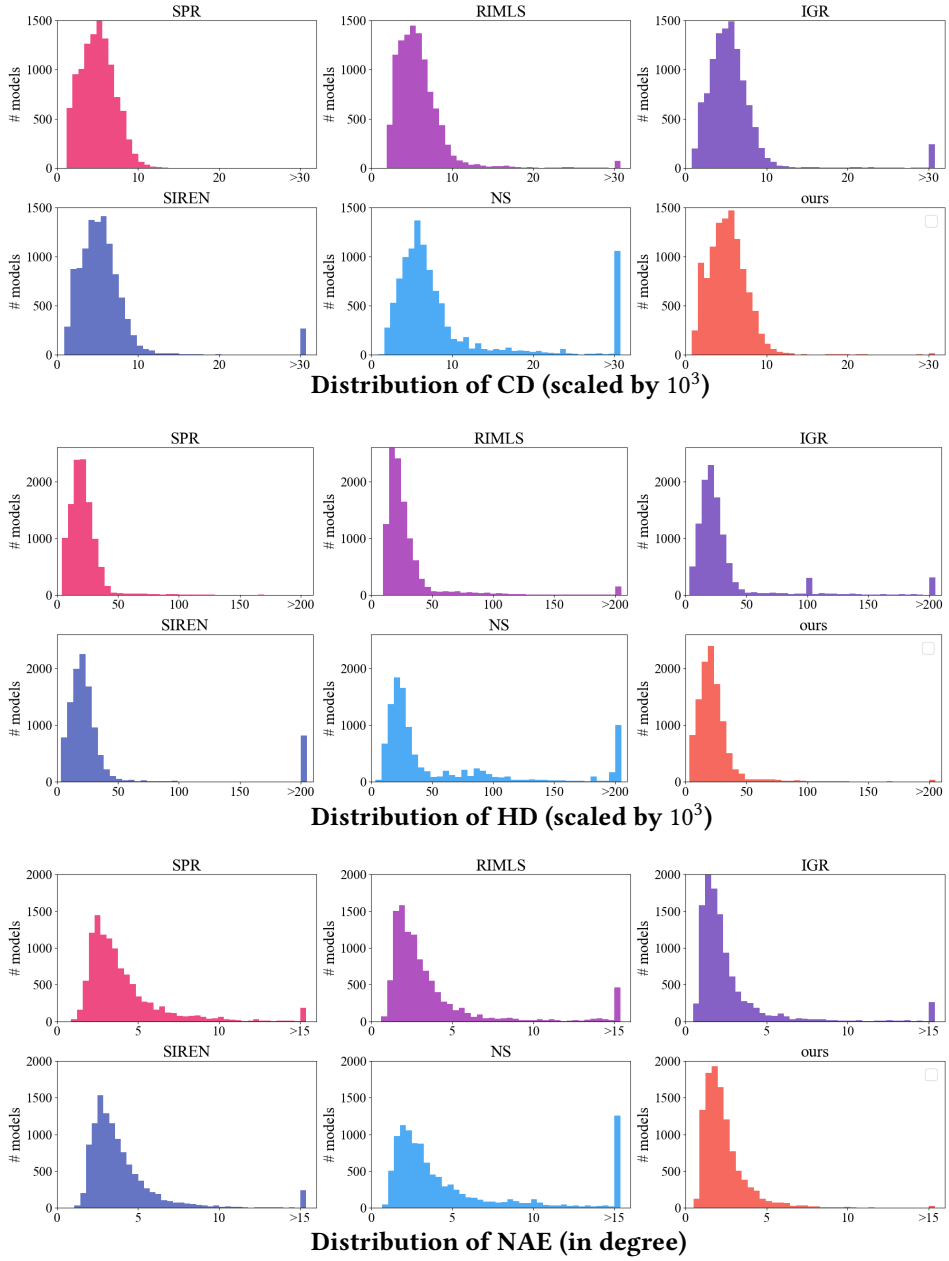

Fig. 2. Metric histogram of different methods. The metrics include CD, HD, and NAE.

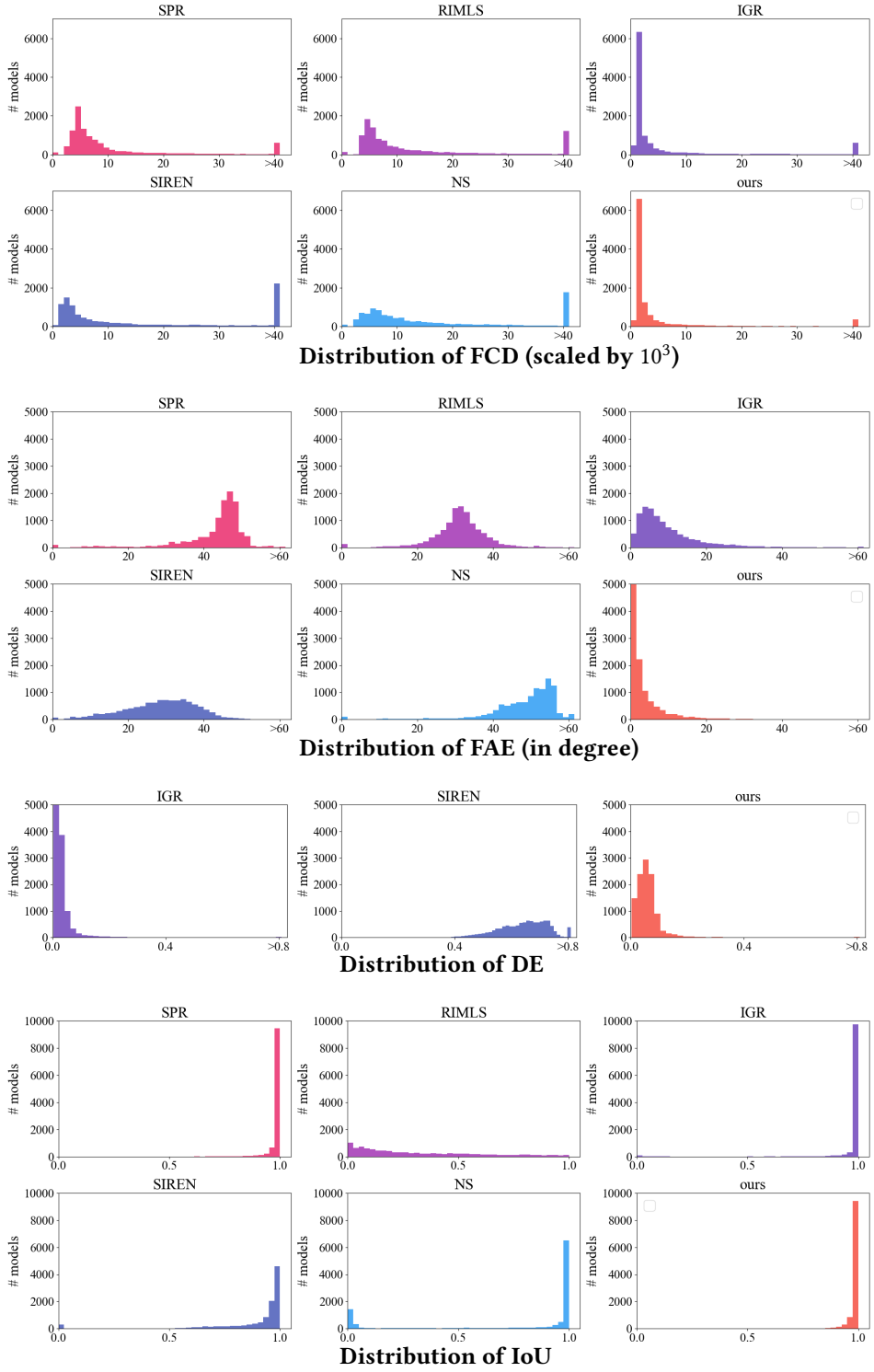

Fig. 3. Metric histogram of different methods. The metrics include FCD, FAE, DE, and IoU.

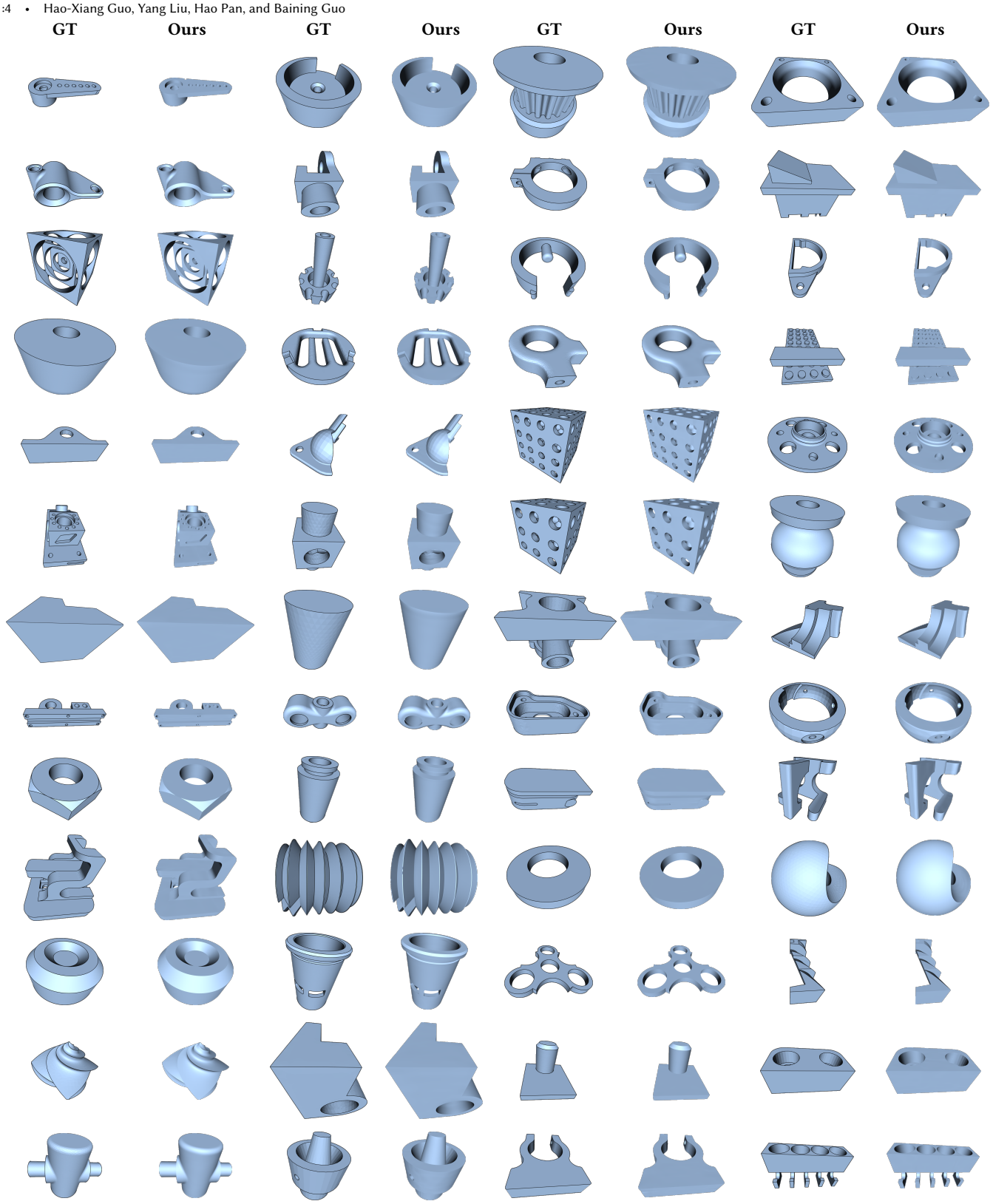

Fig. 4. The ground-truth B-Rep models and the zero isosurfaces of the converted NH-Reps – Part-A.

Fig. 5. The ground-truth B-Rep models and the zero isosurfaces of the converted NH-Reps – Part-B.