Supplementary Material

Self-calibrating Polarising Radiometric Calibration

CVPR 2018

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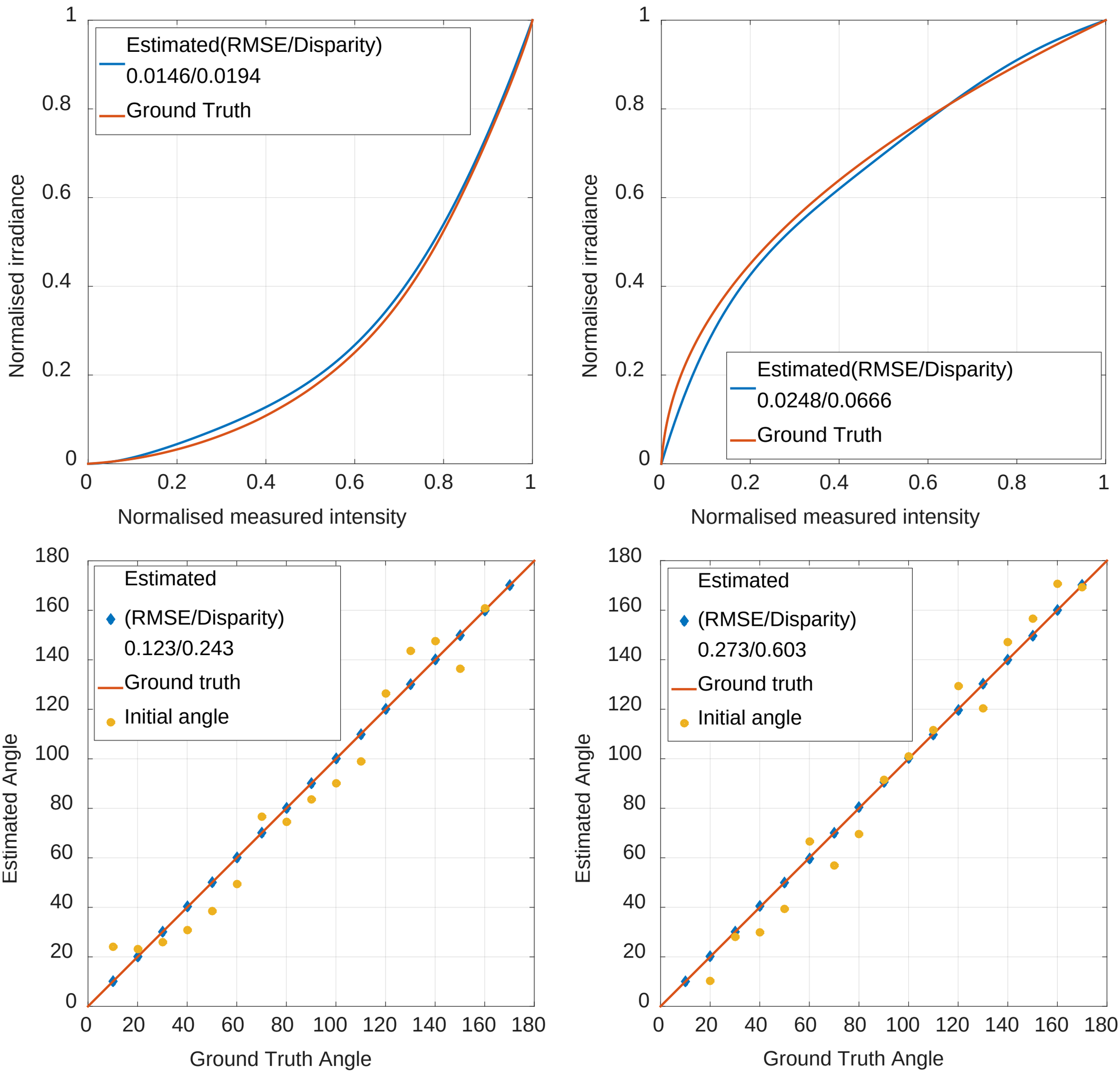
Part I Results from Synthetic Data

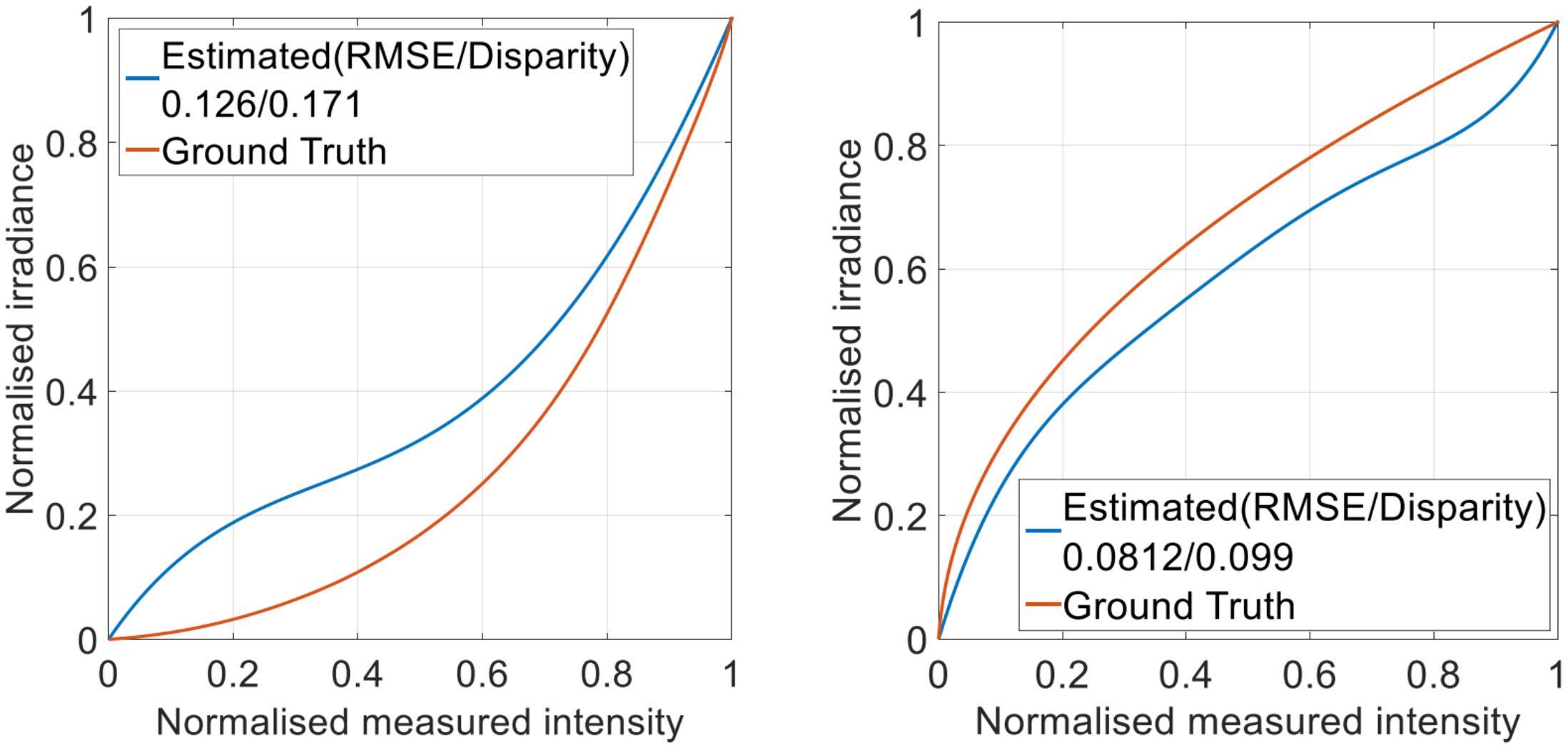
Synthetic sinusoidal curves of different amplitudes, D.C offset and phase were generated, distorted using 2 Camera Response Functions (CRF) from the Database of Response Functions (DoRF) and ran through our method. The figures show examples of 2 recovered ICRF with different curvatures. Our method achieves small errors on the ICRF and the angular estimations.



Recovered ICRF and angular estimations for 2 curves from the DoRF

Part II Optimisation without Convexity Prior

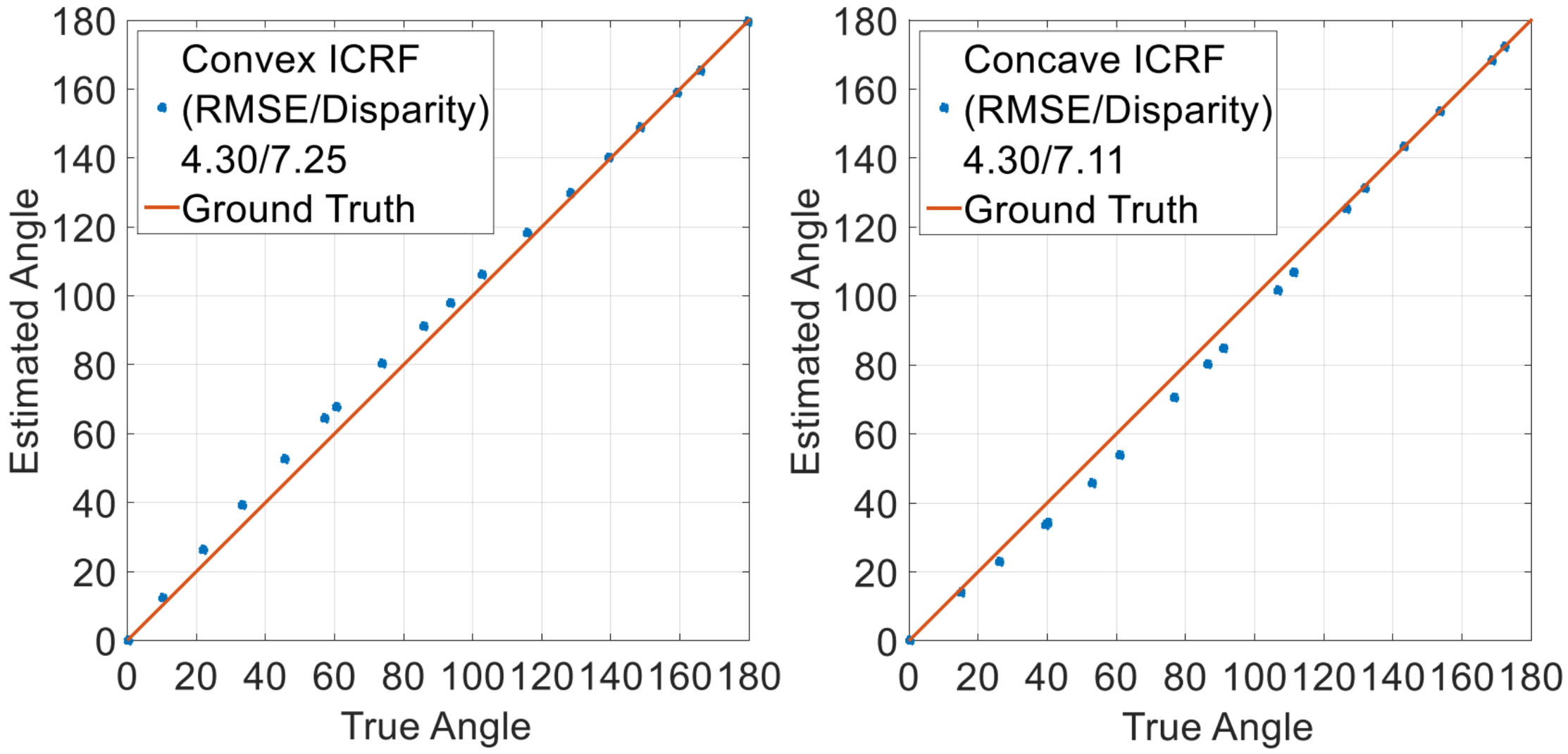
The optimisation was run without imposing the second derivative constraint. The following figure shows the recovered ICRF for the same 2 curves from the DoRF as Part I. We see that the curvature changes and the errors are high, justifying our approach of imposing the convexity prior.



Recovered ICRF for 2 curves from the DoRF

Part III Literature Performance

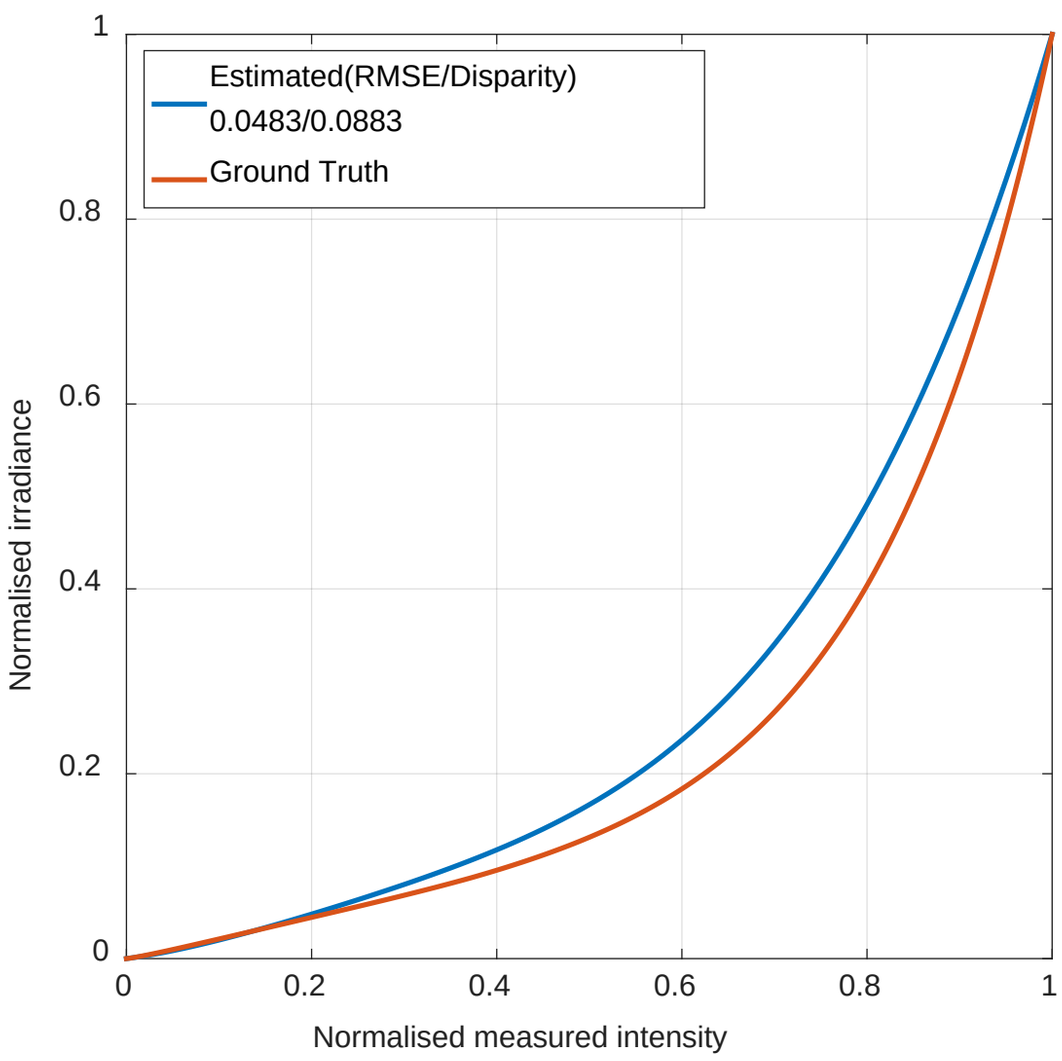
We ran [1] using the same 2 curve IDs as Part I using synthetic data to verify its performance. As the linear CRF assumption no longer holds, we would expect the angular estimation performance to be poor as shown in the following figures. It is interesting to note that for the convex inverse CRF the estimated angles are mostly larger than the ground truth, while for the concave inverse CRF the estimated angles are mostly lower than the ground truth

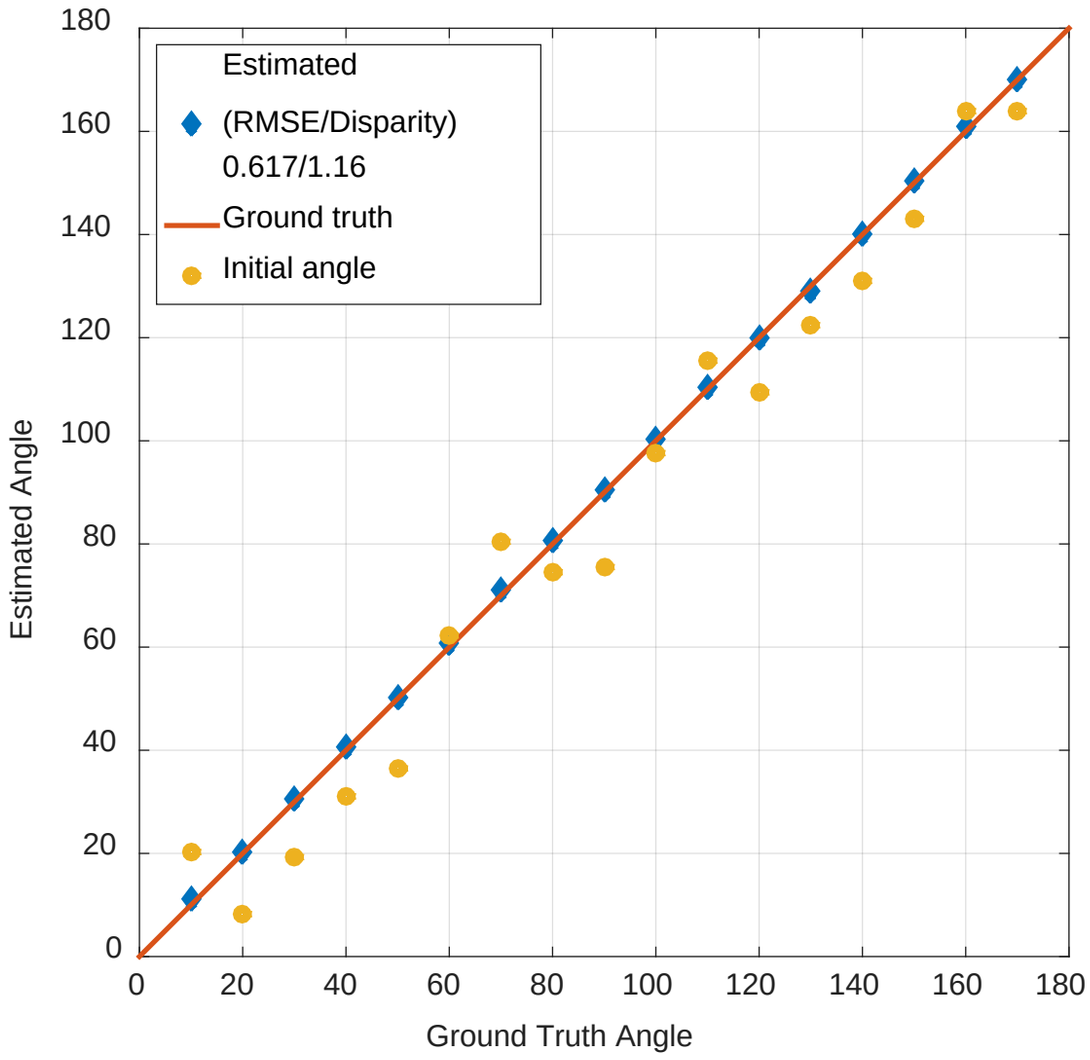


Angular estimations for 2 curves from the DoRF using [1]

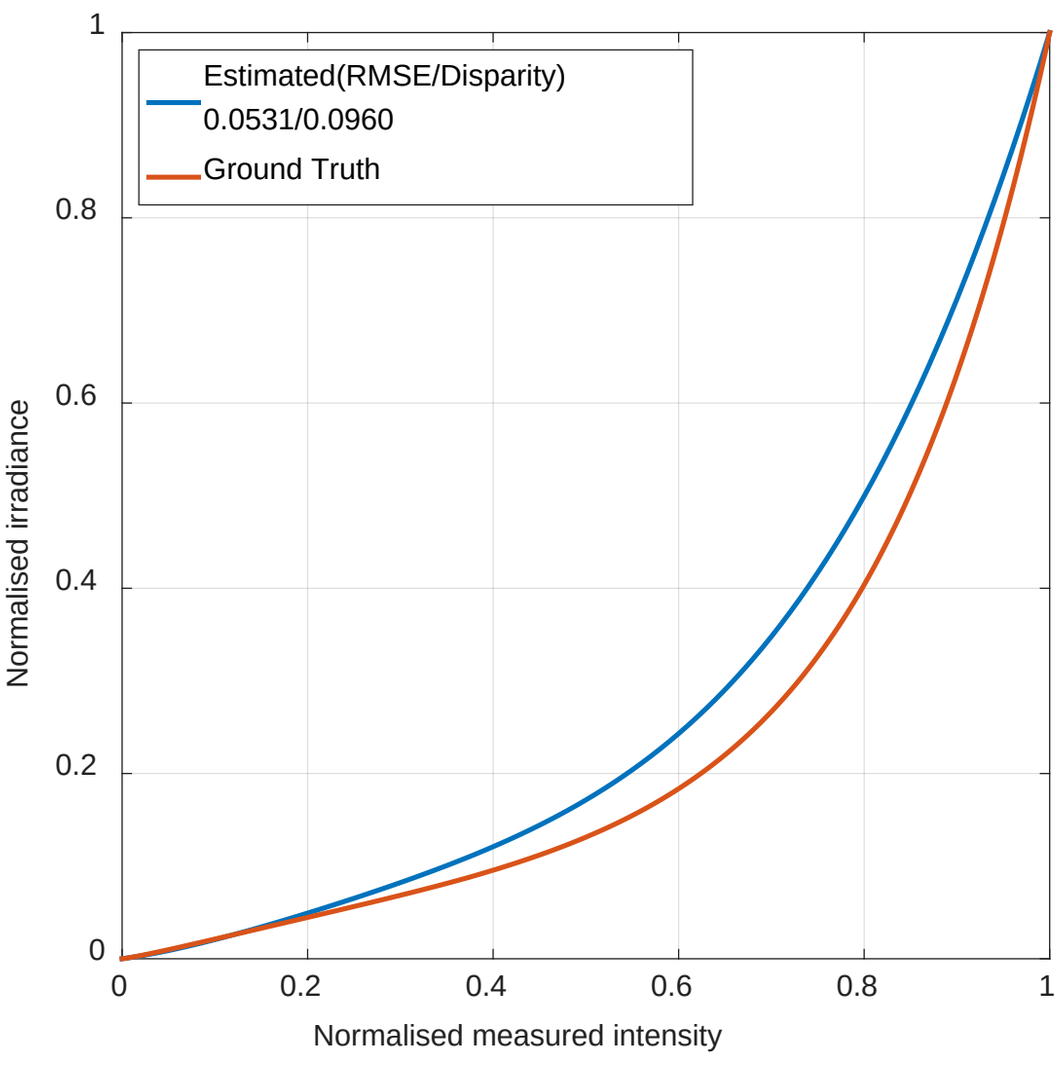
Part IV Comparing for Different Angles Sampled

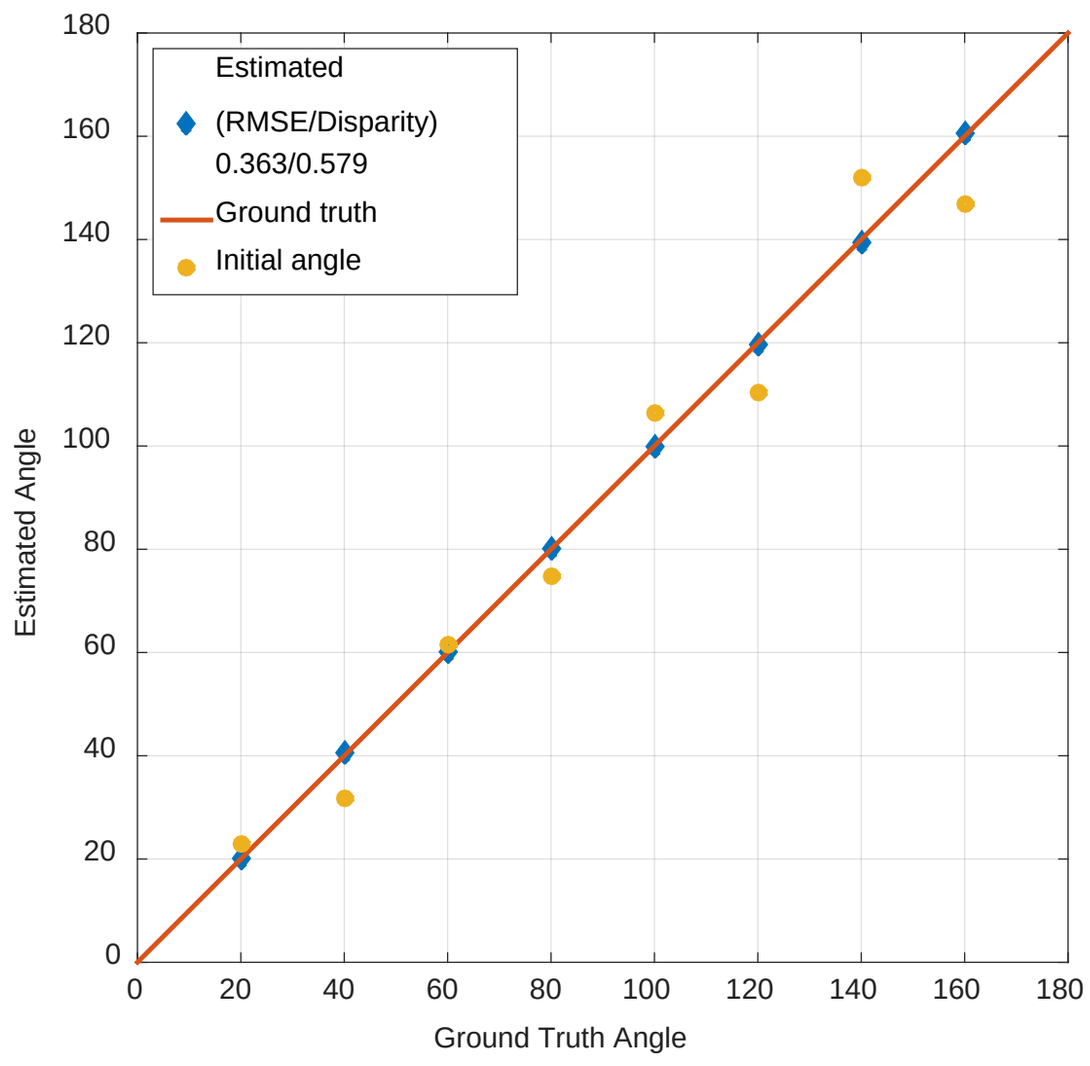
We tested our method using the lion images captured by the Nikon D800E for different sampling angle intervals. The results are shown on this page and the next. In general, we find that the errors for the inverse CRF increases with larger angular intervals, while the angle estimation remains relatively robust with errors below 2 degrees. In the case where the angles are sampled with varying intervals, the errors for the inverse CRF are reduced due to a greater angular sampling density.





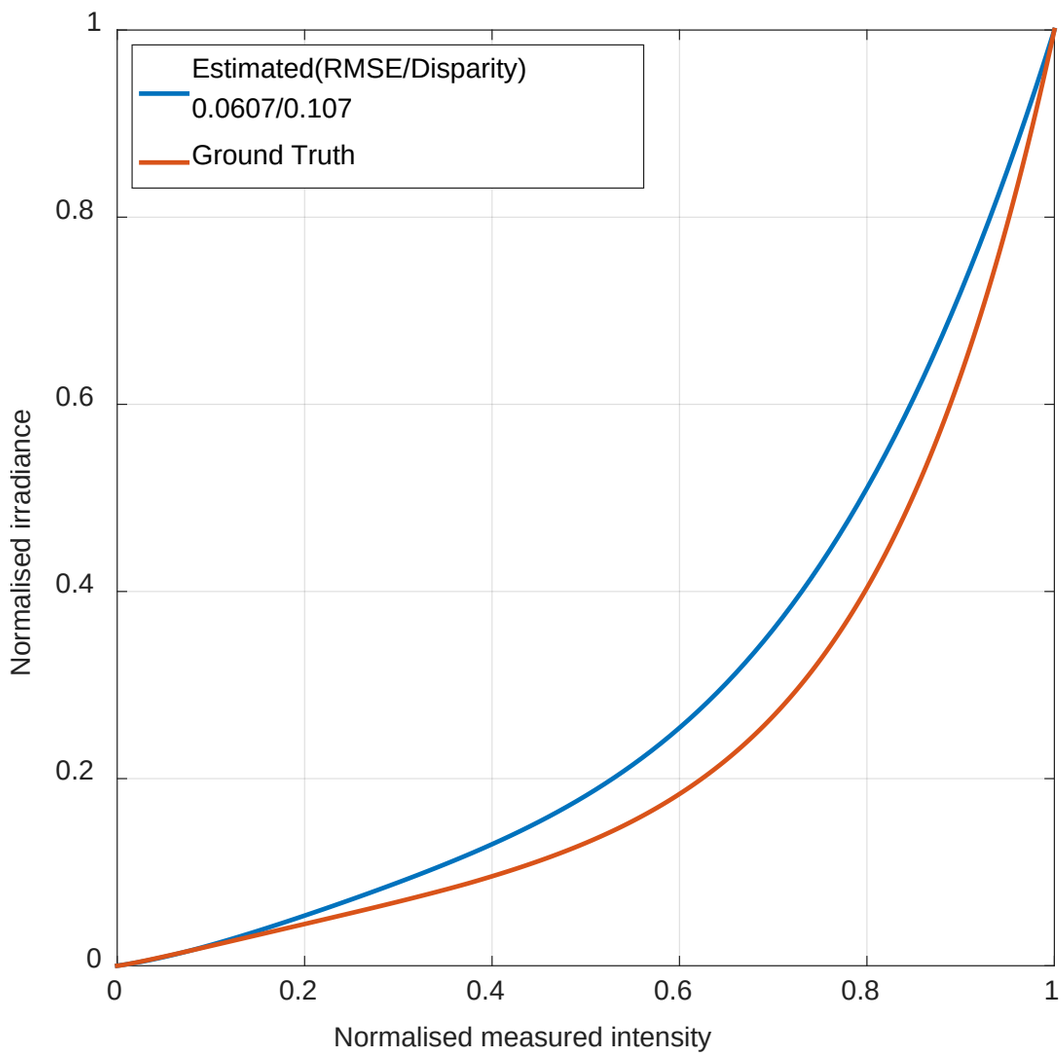
10 degree intervals

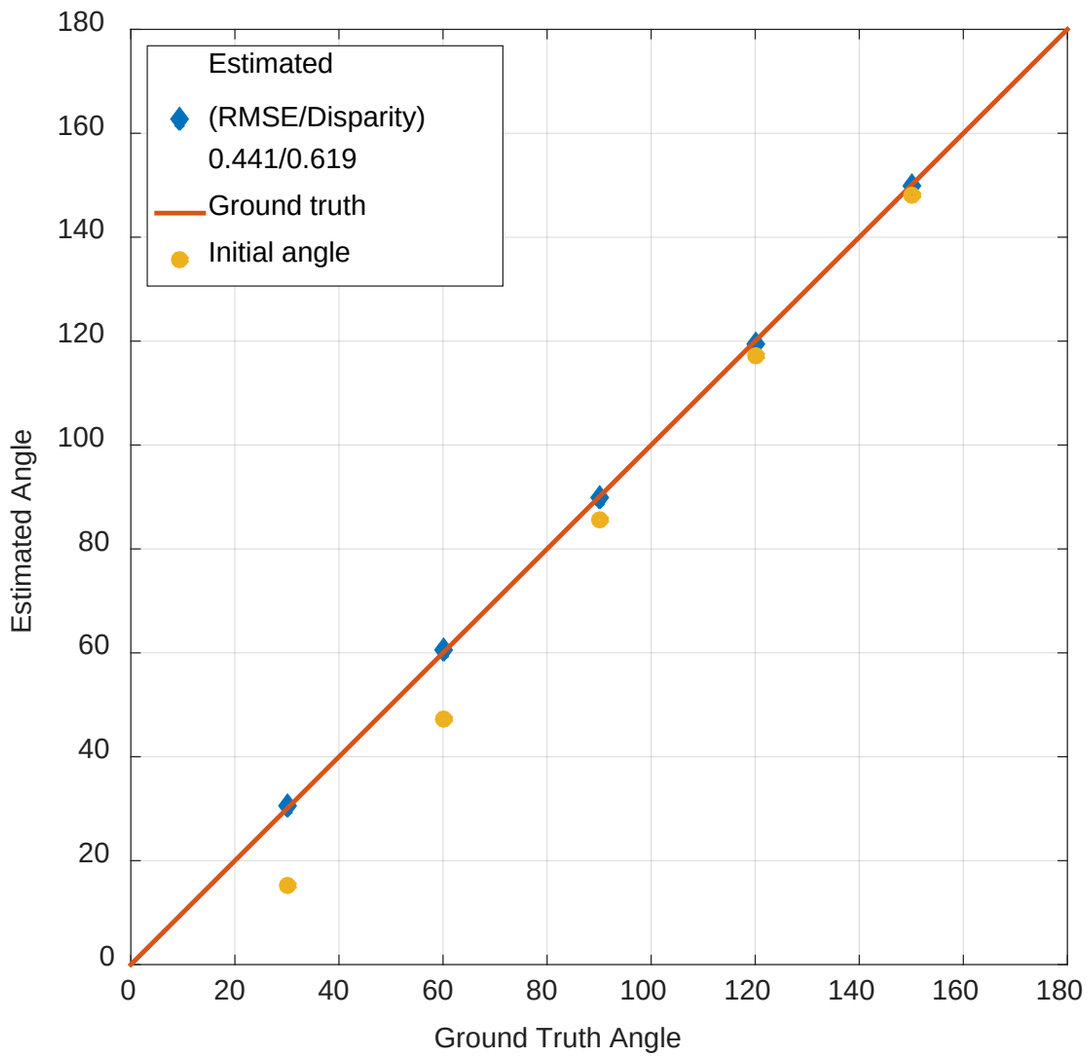




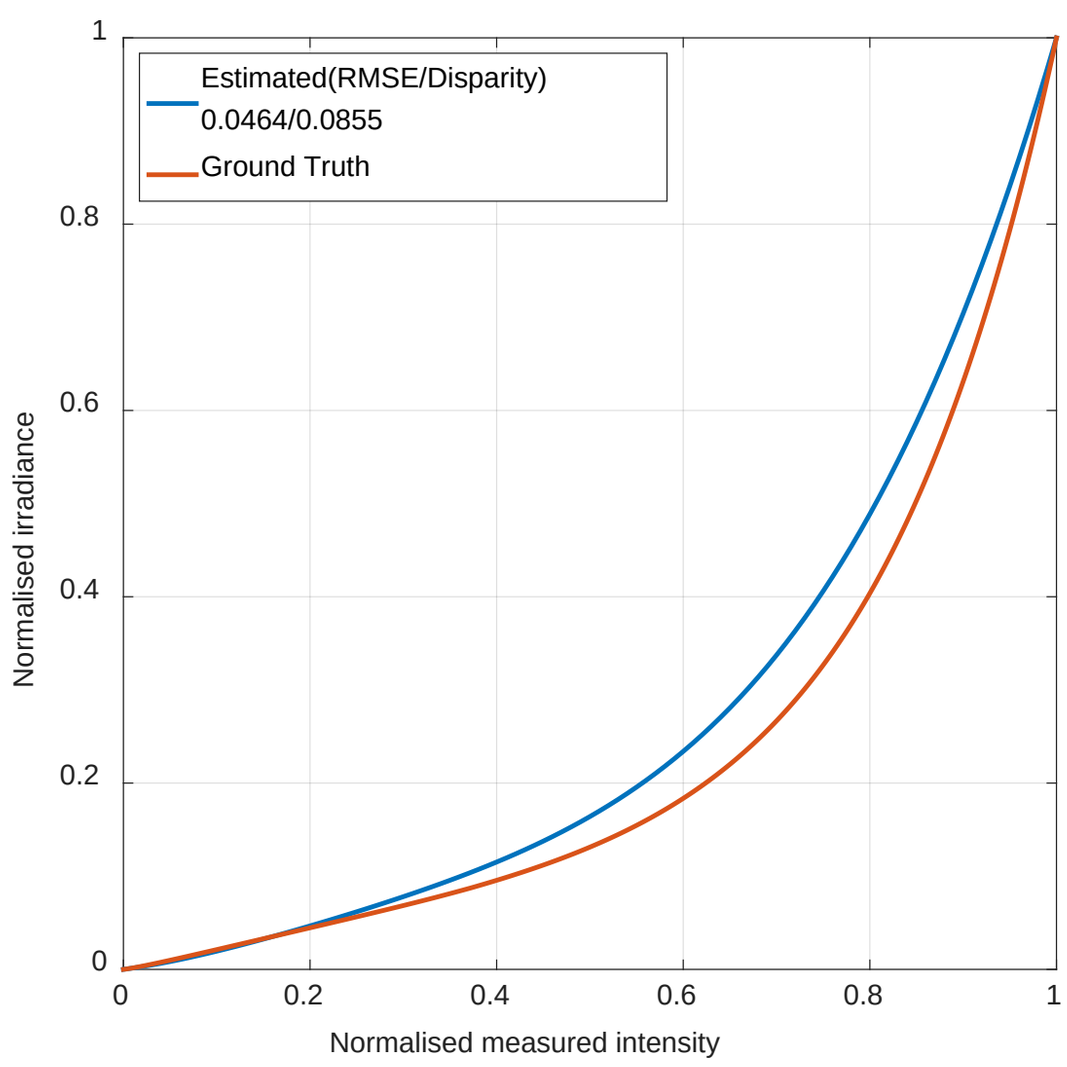
20 degree intervals

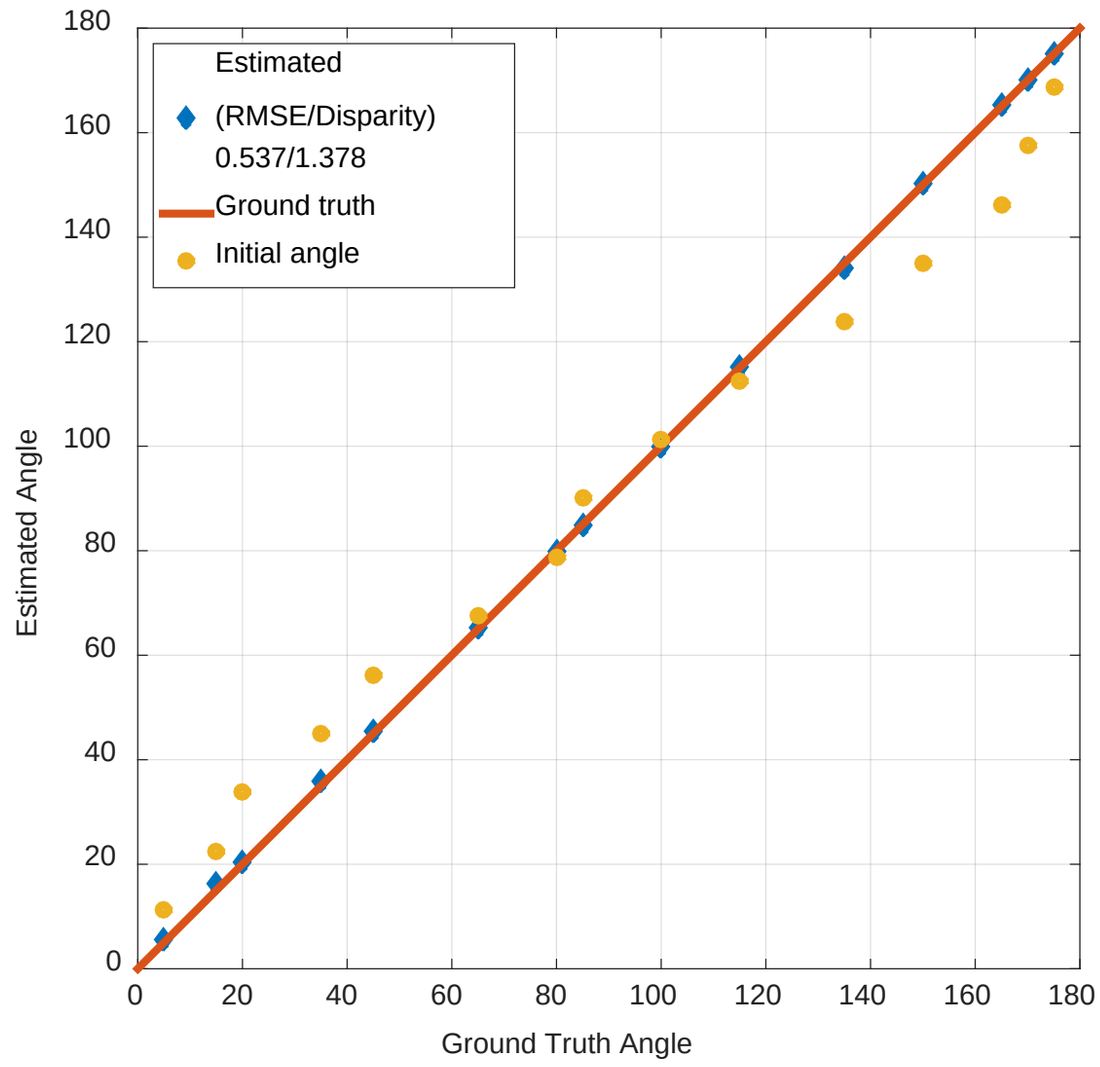
Part IV Comparing for Different Angles Sampled





30 degree intervals





Varying intervals

References

[1] *Y. Y. Schechner. Self-calibrating imaging polarimetry. In Proc. of International Conference on Computational Photography, 2015.*