The Pinax-Model for Accurate and Efficient Refraction Correction of Underwater Cameras in Flat-Pane Housings: MATLAB Examples

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This paper is a supplementary material to our article: "The Pinax-Model for Accurate and Efficient Refraction Correction of Underwater Cameras in Flat-Pane Housings". We provide examples in Matlab for following calculations. In tests Matlab R2014a and R2015a were used.

1 Finding optimal d_0^* distance

Open *Optimal_d_0/Main.m*. Adjust setup parameters: camera intrinsic matrix K, glass thickness d_1, water and glass refraction indices n_w and n_g. Run the script: ${}^p d_0^* =$ *optimal_phisical_d_0* [mm], ${}^v d_0^* =$*virtual_d_0* [mm].

2 Calculating correction maps

To run this example mex opencv is required (https://github.com/kyamagu/mexopencv). Code responsible for analytical forward projection was provided by authors of [1]. To see the example open and run *Find_correction_map/FindMap.m*. Remember to adjust all the camera information and setup parameters. As an output two files are created: *MapX.txt* and *MapY.txt*. These can be used for image correction, e.g. with opencv *remap(...)* function (compare C/C++ examples). There is also a test image loaded, remapped and saved.

References

[1] A. Agrawal, S. Ramalingam, Y. Taguchi, and V. Chari, "A theory of multi-layer flat refractive geometry," in *Computer Vision and Pattern Recognition (CVPR), 2012 IEEE Conference on*, pp. 3346–3353, June 2012.