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Sonar Image formation and shape recognition techniques

ABSTRACT - Masterthesis

The "Sonar Image Formation and Shape Recognition Techniques" handles the following assignment of tasks: simulation of the high-resolution beam former SONAR measurement performance, development and valuation of the 3D image formation and Shape recognition algorithms.

In this connection the under-water scene simulation and ray-tracing based measurement simulation were developed. The introduced image formation algorithms include the 3D voxel image formation and the direct shape recognition supported by the noise suppression techniques.

The underwater measurement simulation provides the discrete signal models, which can be generally used for the development and testing of the signal and 3D image processing algorithms. The proposed image formation and shape recognition techniques enable the very efficient information processing and storage.

Moreover these methods combine the advantages of both significant resolution improvement and robustness against the noise influence. Thus the obtained image quality becomes comparable to the noiseless imaging though the relative noisy environments. Also the enabled scene resolution rises above the system and signal permitted values.

The further advantage of the in this work introduced shape coding method is given by the conventional 2D image processing application opportunity. The developed shape imaging techniques provide a solid base for the further scene pre-selection, pattern recognition and classification performance.