

Averaging by quasioptical filtering

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1 Theoretical Background

Averaging of images of identical specimens (motive) for the purpose of noise elimination has a long history in many research fields. According to theory, averaging over a correct set of images is equivalent to the result of Fourier filtration of a regular 2D montage of that set (using appropriate delta-functions as a mask) to pass only the Fourier components associated with the signal. (Aebi 1973)

2 Calculation

A noisy 2D crystals should be quasi optically filtered in order to restore a noiseless motive.

The method requires:

- Fourier transform the original image
- Mask the Fourier transform
- Integrate the density in the masked region
- Perform an inverse Fourier transform

3 Objective

Using Matlab implemented a quasi optical filtration of a 2D crystal

4 Bibliography

R Henderson, JM Baldwin, KH Downing, J Lepault, F Zemlin. Structure of purple membrane from halobacterium halobium: recording, measurement and evaluation of electron micrographs at 3.5 Å resolution. Ultramicroscopy 19:147-178, 1986.