

# Image deblurring and structured matrices

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Abstract: Current image deconvolution problems involve images of large dimensions. To handle the related computational issues, filtering techniques based on the fast Fourier transform (FFT) are widely used, although they do not always provide accurate image restoration. This course introduces discrete convolution operators and the discrete Fourier transform. Using the spectral factorization of the blurring matrix, fast regularization methods can be implemented by resorting to the FFT. To improve the quality of the restored images, more sophisticated deconvolution models are considered both in terms of boundary conditions and regularization operators. The structure of the blurring matrix is explored to define fast and stable iterative regularization methods even in the case of nonlinear models that aim to enforce the sparsity of the solution in a certain basis.

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