Fast and direct inverse nonequispaced Fourier transforms

Melanie Kircheis
Chemnitz University of Technology, Germany
melanie.kircheis@math.tu-chemnitz.de

The well-known discrete Fourier transform (DFT) can easily be generalized to arbitrary nodes in the spatial domain. The fast procedure for this generalization is referred to as nonequispaced fast Fourier transform (NFFT). Various applications such as MRI, solution of PDEs, etc., are interested in the inverse problem, i.,e., computing Fourier coefficients from given nonequispaced data. In contrast to iterative procedures, where multiple iteration steps are needed for computing a solution, we focus especially on so-called direct inversion methods. We review density compensation techniques and introduce a new scheme that leads to an exact reconstruction for trigonometric polynomials. In addition, we consider a matrix optimization approach using Frobenius norm minimization to obtain an inverse NFFT.

Joint work with Daniel Potts (Chemnitz University of Technology, Germany).