

Shearlets in MRI - Theory and applications

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Abstract

In this talk we discuss the MRI machine in more detail and explain the physical processes that are behind and lead to the so-called 'Fourier measurements'. In particular, we discuss the sampling process and link this to (realistic) compressed sensing. It turns out, that data is acquired by continuous lines in the k -space and the idea of taking (random) point measurements is not realistic. Our preliminary (numerical) results with actual sampling schemes, such as horizontal lines, show that compressed sensing together with shearlets as a sparsifying transform has huge potential to improve the current methods that are used in medicine.

Further, we discuss the (almost optimal) sparse approximation rate of shearlets. The asymptotic rate is shown by analysing the decay of the frame coefficients which leads to reconstructions with respect to the dual shearlets. In this talk we will also discuss the decay of the dual frame coefficients and, hence, consider reconstructions with the actual shearlet system.