Performance of l1-norm minimizing regularizers on phase/magnitude reconstruction in flow encoded MRI

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In cardiovascular diseases, the role of disturbed blood flow, and therefore, the assessment and quantification of the hemodynamic is of great interest. Three dimensional (3D) cine phase contrast (PC) [1, 2] velocity mapping is a non-invasive MRI technique resolving time-varying velocity vector fields of blood flow from which different physical parameters and stream or path lines can be derived. Thus, it provides a powerful tool to visualize and quantify flow related physiology and pathophysiology. However, long measurement times due to the acquisition of three velocity encoded data segments and one reference frame mainly prevent its application in routine clinical use. The reconstructed velocity components themselves are directly proportional to the phase difference between the reference frame and the corresponding velocity encoded images. In contrast, Fourier velocity encoding (FVE) [1, 3] is an extension of PC which samples the distributions of the within a voxel by acquiring a range of velocity encoded images in so-called kv-space, and thus, a real valued object instead of phase is reconstructed at the expense of additional scan time increase.

Recently, an auto-calibrating coil-by-coil parallel imaging (acPI) acceleration technique [4] providing a very general reconstruction formalism for arbitrary MR signal space sampling trajectories has been proposed. In this talk, we will present initial results of an extension of this acPI method exploiting temporal correlations in flow encoded dynamic imaging [5]. Additionally, a focus is set on the phase/magnitude reconstruction accuracy of l_1-norm minimizing regularizers to compare the performance of Compressed Sensing [6] applied to PC and FVE, respectively.

References

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