Mend It, Don't End It:
Improving GRAPPA using Simultaneous Sparsity

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Pre-dating compressed sensing by several years, GRAPPA is an effective and well-known method for forming reconstructions in accelerated parallel MRI when highly-accurate RF field maps are not available a priori. This talk will summarize our approaches to improving image reconstructions at high accelerations, where GRAPPA alone is not adequate, without discarding GRAPPA entirely. Sparse Reconstruction of Images using the Nullspace Method and GRAPPA (SpRING) is a method that effectively denoises a GRAPPA reconstruction by a combination of fidelity to GRAPPA and a measure of wavelet-domain simultaneous sparsity. A second method changes the GRAPPA kernel calibration using a simultaneous sparsity regularization, enabling a reduction in ACS data. Both methods allow uniform undersampling and thus a less-radical departure from established acquisition techniques than some compressed sensing methods.

The talk will include joint work with Elfar Adalsteinsson, Leo Grady, Jonathan R. Polimeni, Lawrence L. Wald, and Daniel S. Weller.