1154-90-492 **Nicholas Dwork*** (nicholas.dwork@ucsf.edu), nicholas.dwork@ucsf.edu, CA, **Daniel O'Connor**, CA, and **Corey A. Baron** and **Ethan M. I. Johnson**, IL, **John M. Pauly**, CA , and **Peder Larson**, CA. *utilizing the sparsity structure generated by the wavelet transform with compressed sensing.* Preliminary report.

Compressed sensing (CS) relies on the property that a linear transformation of the result is sparse. Fourier Sampling is often imposed by the problem (e.g. MRI), and the Discrete Daubechies Wavelet Transform (DDWT) is a common sparsifying transformation used in practice. Natural images are sparse after a wavelet transform; however, the vector elements corresponding to low frequency components of the data are not. This observation led to multi-level sampling schemes. Previously, the size and shape of the different levels have been determined heuristically.

In this work, we show that the DDWT imposes a specific structure on the sparsity pattern. The square region corresponding to low frequencies is not sparse, and the bins corresponding to high frequencies in any direction are sparse. When the DDWT is applied recursively, the pattern continues, but the average cardinality of the vector increases with iteration.

Thus, for improved accuracy, the CS problem should be altered in the following ways. 1) The structure of the multi-level sampling scheme should be squares with sizes corresponding to the different resolutions of the sub-images of the DDWT. 2) The objective function should be modified to impose an L1 norm on the sparse regions and an L2 norm on the low-frequency region. (Received September 16, 2019)