962-42-830 **Akram Aldroubi*** (aldroubi@math.vanderbilt.edu), Dept. of Math., Vanderbilt University, Nashville, TN 37240, and **Peter Basser** and **Sinisa Pajevic**. *Reconstruction of Diffusion Tensor Magnetic Resonance Images.*

A tensor image $\{D(x_j)\eta(x_j); j \in J\}$ acquired by Diffusion Tensor Magnetic Resonance Imaging (DT-MRI) can be modeled as a sampled tensor valued function $D(x),\ x \in R^3$ to which noise η_j is added. The tensor field $D(x),\ x \in R^3$ represents three dimensional diffusion properties of water and can be used to elucidate architectural features of anisotropic fibrous tissues and organs in vivo. To achieve this goal, the tensor $D(x),\ x \in R^3$ must first be reconstructed from the discrete noisy data set $\{D(x_j)\eta(x_j); j \in J\}$, which can be large. Thus, a reconstruction algorithm must reduce noise and be computationally efficient. For this purpose, we use shift invariant spaces to model the tensor $D(x),\ x \in R^3$ and derive fast filtering algorithms for reconstructing $D(x),\ x \in R^3$ from $\{D(x_j)\eta(x_j); j \in J\}$. Using $D(x),\ x \in R^3$, fiber trajectories can then be tracked by solving a differential equation for the evolution of space curves that follow the direction of maximum diffusivity, i.e., the eigenvector of $D(x),\ x$ associated with the largest eigenvalue. (Received September 27, 2000)