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415, Athens, GA 30602. *Empirical Mean Curve Decomposition for fMRI Signal Processing.*

fMRI blood-oxygenation level dependent (BOLD) signal is characterized by its non-linearity, non-stationarity and composition of signal components at multiple time scales, which imposes significant challenges to inferring meaningful information from it. In responses, we present a novel data-driven multi-scale signal decomposition framework named Empirical Mean Curve Decomposition (EMCD) that iteratively extracts mean envelope components from fMRI signals for the purpose of functional brain mapping. The EMCD approach has been applied in three significant fMRI applications including task-based fMRI for activation detection, resting state fMRI for functional connectivity analysis, and natural stimulus fMRI for correlation analysis of multimedia feature curves and fMRI signals. (Received January 03, 2011)