1117-68-502 **Jingsai Liang*** (jl4z@mtmail.mtsu.edu), 2850 Middle Tennessee Blvd, Apt A12, Murfreesboro, TN 37130, and **Don Hong**. *Non-Gaussian Penalized PARAFAC Analysis of fMRI(Functional Magnetic Resonance Imaging) Data.*

Independent Component Analysis(ICA) has been used successfully in Functional Magnetic Resonance Imaging(fMRI) data analysis. As an extension of the ICA, Tensorial Probabilistic ICA(TPICA) is to decompose the fMRI data into three-mode(subject $\times$ temporal $\times$ spatial). Parallel Factor Analysis(PARAFAC) is another method to process three-mode data. While only the spatial mode has the priority to be processed in TPICA, three modes are equally and simultaneously processed in PARAFAC. One drawback of PARAFAC is that it will converge to some degenerate solutions if the data does not meet the requirements of full rank in three-mode matrices. Meanwhile TPICA can not perform well in the presence of overlapping of activation patterns in the spatial mode. So both of TPICA and PARAFAC can not process three-mode fMRI data perfectly. In this paper, via adding a penalty term to PARAFAC, we impose the constraint of the non-Gaussian character on the calculation step of the spatial mode. This penalized PARAFAC algorithm can drive the spatial sources as non-Gaussian as possible to avoid the degenerate solutions and does not need the independent constraint of the spatial sources. fMRI data analysis examples show that the proposed method outperforms both the TPICA and PARAFAC methods. (Received January 19, 2016)