1125-15-1189 **Jun Ji***, Department of Mathematics, Kennesaw State University, 1100 S. Marietta Pkwy, Marietta, GA 30060, and **Yimin Wei**. *Weighted Moore-Penrose Inverses and the Fundamental Theorem of Even-Order Tensors with Einstein Product.* Preliminary report.

We treat even-order tensors with Einstein product as linear operators from tensor space to tensor space, define the null spaces and the ranges of tensors, and study their relationship. We consider the weighted Moore-Penrose inverse of an even-order tensor and extend the fundamental theorem of linear algebra for matrix spaces to tensor spaces. Using the new relationship, we characterize the least-squares ($\mathcal{M}$) solutions to a multilinear system and establish the relationship between the minimum-norm ($\mathcal{N}$) least-squares ($\mathcal{M}$) solution of a multilinear system and the weighted Moore-Penrose inverse of its coefficient tensor. (Received September 15, 2016)