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THE STRUCTURE OF LINEAR PRESERVERS OF LEFT MATRIX MAJORIZATION ON $\mathbb{R}^P$ *

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Abstract. For vectors $X, Y \in \mathbb{R}^n$, Y is said to be left matrix majorized by X ($Y \prec_\ell X$) if for some row stochastic matrix R, $Y = RX$. A linear operator $T : \mathbb{R}^p \to \mathbb{R}^n$ is said to be a linear preserver of $\prec_\ell$ if $Y \prec_\ell X$ on $\mathbb{R}^p$ implies that $TY \prec_\ell TX$ on $\mathbb{R}^n$. The linear operators $T : \mathbb{R}^p \to \mathbb{R}^n$ ($n < p(p-1)$) which preserve $\prec_\ell$ have been characterized. In this paper, linear operators $T : \mathbb{R}^p \to \mathbb{R}^n$ which preserve $\prec_\ell$ are characterized without any condition on n and p.

Key words. Row stochastic matrix, Doubly stochastic matrix, Matrix majorization, Weak matrix majorization, Left (right) multivariate majorization, Linear preserver.

AMS subject classifications. 15A04, 15A21, 15A51.

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