LIMITED APPROXIMATION OF
NUMERICAL RANGE OF NORMAL MATRIX

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Abstract. Let A be an $n \times n$ normal matrix, whose numerical range $NR[A]$ is a k-polygon. If a unit vector $v \in W \subseteq \mathbb{C}^n$, with $dim W = k$ and the point $v^*Av \in \text{Int} NR[A]$, then $NR[A]$ is circumscribed to $NR[P^*AP]$, where P is an $n \times (k-1)$ isometry of $\{\text{span}\{v\}\}_W^\perp \to \mathbb{C}^n$, [1]. In this paper, we investigate an internal approximation of $NR[A]$ by an increasing sequence of $NR[C_s]$ of compressed matrices $C_s = R_s^*AR_s$, with $R_s^*R_s = I_{k+s-1}$, $s = 1, 2, \ldots, n-k$ and additionally $NR[A]$ is expressed as limit of numerical ranges of k-compressions of A.

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