

M. Šilhavý

Dip. di Matematica, Università di Pisa, Largo Bruno Pontecorvo 5, 56127 Pisa, Italy
Mathematical Institute, Academy of Sciences, Žitná 25, 115 67 Prague 1, Czech Republic
silhavy@math.cas.cz

Zeros of the Polyconvex Hull of Powers of the Distance and s -Polyconvexity

Let dist_K be the distance from a compact set $K \subset \mathbb{M}^{m \times n}$ in the space of $m \times n$ matrices. This note determines the set $M_p \subset \mathbb{M}^{m \times n}$ of zeros of the polyconvex hull of dist_K^p where $1 \leq p < \infty$. It is shown that the set-valued map $p \mapsto M_p$ is constant on the intervals $[1, 2), \dots, [q-1, q), [q, \infty)$ where $q := \min\{m, n\}$, while at $p = 1, \dots, q$ the set M_p generally jumps down discontinuously. The values M_s , $s = 1, \dots, q$, at the beginnings of intervals of constancy are characterized as s -polyconvex hulls $\mathcal{P}^s K$ of K to be defined below, where $\mathcal{P}^1 K$ is the convex hull and $\mathcal{P}^q K$ the standard polyconvex hull. As an illustration, $\mathcal{P}^s SO(n)$ are evaluated for all s if $1 \leq n \leq 4$, and for n arbitrary if $n \geq s > n/2$ and/or $s = 1$. In the remaining cases only bounds are obtained.

Keywords: Semiconvexity, polyconvexity, polyconvex hulls, rotational invariance.

MSC: 49J45; 74B20