Given a domain $D$ in $\mathbb{C}^n$ and $K$ a compact subset of $D$, the set $A^D_K$ of all restrictions of functions holomorphic on $D$ the modulus of which is bounded by 1 is a compact subset of the Banach space $C(K)$. The sequence $(d_m(A^D_K))_{m \in \mathbb{N}}$ of Kolmogorov $m$-widths of $A^D_K$ provides a measure of the degree of compactness of the set $A^D_K$ in $C(K)$. In the 1980s Zakharyuta showed that for suitable $D$ and $K$ the asymptotics

$$\lim_{m \to \infty} - \log d_m(A^D_K) = \frac{n!}{C(K, D)}^{1/n}, \quad (*)$$

where $C(K, D)$ is the relative capacity of $K$ in $D$, is implied by a conjecture, now known as Zakharyuta’s Conjecture. This conjecture was proved by Nivoche in 2004 thus settling (*) at the same time.

We shall give a new proof of the asymptotics (*) which does not rely on Zakharyuta’s Conjecture. Instead we proceed more directly by a two-pronged approach establishing sharp upper and lower bounds for the Kolmogorov widths. The lower bounds follow from concentration results for the eigenvalues of a Toeplitz operator, while the upper bounds follow from an exhaustion procedure by special holomorphic polyhedra. (Received July 08, 2019)