Some inequalities for elementary symmetric polynomials in the complex domain

Miloš Arsenović[1] and Radoš Bakić[2]

[1]Department of Mathematics, University of Belgrade, Studentski Trg 16, 11000 Beograd, Serbia, arsenovic@matf.bg.ac.rs
[2]Teacher Education Faculty, University of Belgrade, Kraljice Natalije 43, 11000 Beograd, Serbia, bakicr@gmail.com

We are investigating problem of finding the upper bound of the modulus of elementary symmetric polynomials $e_k(z_1, \ldots, z_n)$, where variables $z_1, \ldots, z_n$ are subject to conditions $z_1 + \cdots + z_n = 0$ and $|z_j| \leq R$ for all $j = 1, \ldots, n$. We give a sharp upper bound in the case $k = n - 1$. It turns out that the same estimate is valid for the real variables case, in fact, the complex case is reduced to the real one. We also give an estimate in the case $k = n - 2$, which is sharp for even n. These estimates are then applied to give results on location of zeros of polynomials.