

On removing the restriction from $\beta_{n_j}, j = 0, 1, 2, \dots, n$ in Corollary 4.1 i.e. $\alpha_{n_0} \leq \alpha_{n_1} \leq \dots \leq \alpha_{n_k}$ and for all β_{n_j} in $p(q) = \sum_{\nu=0}^k q^{n_\nu} a_{n_\nu}$, we have from (4.18)

$$\begin{aligned} |\xi_1(q)| &\leq MR^n \left\{ \sum_{j=1}^k (|\alpha_{n_j} - \alpha_{n_{j-1}}| + |\beta_{n_j} - \beta_{n_{j-1}}|) + |\alpha_{n_0}| + |\beta_{n_0}| \right\} \\ &\leq MR^n \left\{ (\alpha_{n_k} - \alpha_{n_0} + |\alpha_{n_0}|) + 2 \sum_{j=0}^{k-1} |\beta_{n_j}| \right\} \end{aligned} \quad (4.23)$$

and on combining it with (4.20), we have the following;

Corollary 4.2. Let $p \in \mathbb{P}_n$ with $a_{n_l} = \alpha_{n_l} + \beta_{n_l}i$ such that no two adjacent coefficients a'_{n_j} s are equal, i.e. $a_{n_j} \neq a_{n_{j+1}}, j = 0, 1, 2, \dots, k$ and $\alpha_{n_0} \leq \alpha_{n_1} \leq \dots \leq \alpha_{n_k}$ and for all $\beta_{n_j}, 0 \leq j \leq n$. Further let $M_{n_j}, 1 \leq j \leq k$ with M as defined in Theorem 2.1. Then all the zeros lie in

$$(4.24) \quad |q| \leq \frac{M}{|a_n|} \left\{ (\alpha_n - \alpha_0 + |\alpha_0|) + 2 \sum_{j=0}^{k-1} |\beta_{n_j}| + |\beta_n| \right\}.$$

Setting $\beta_{n_j} = 0, j = 0, 1, \dots, n$ and taking $\alpha_{n_j} = a_{n_j}, j = 0, 1, \dots, n$, we have the following result from Corollary 4.2.

Corollary 4.3. Let $p(q) = \sum_{\nu=0}^n q^{n_\nu} a_{n_\nu}$ such that no two adjacent coefficients a'_{n_j} s are equal, i.e. $a_{n_j} \neq a_{n_{j+1}}, j = 0, 1, 2, \dots, k$ and $\alpha_{n_0} \leq \alpha_{n_1} \leq \dots \leq \alpha_{n_k}$. Further let $M_{n_j}, 1 \leq j \leq k$ with M as defined in Theorem 2.1. Then all the zeros of $p(q)$ lie in

$$(4.25) \quad |q| \leq \frac{M}{|a_n|} (\alpha_n - \alpha_0 + |\alpha_0|).$$

5. CONCLUSION

Over the past ten years, the regular functions of the quaternionic variable have been introduced and thoroughly examined. Their diverse applications across a wide range of scientific disciplines have contributed significantly to their rapid development and have shown themselves to be a rich topic for investigation. We note that it became interesting to determine the regions containing some or all of the zeros of a regular polynomial of quaternionic variable following the study of the structure of zero sets and the Fundamental Theorem of Algebra for regular polynomials. The distribution of zeros for polynomials with quaternionic variables and quaternionic coefficients was not well covered in the literature. Here, we derive regions that contain all of the zeros of a regular polynomial of a quaternionic variable when the structure of the zero sets established in the recently developed theory of regular functions and polynomials of a quaternionic variable, as well as a maximum modulus theorem, restrict the real and imaginary parts of its coefficients.