Abstract

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Let $\mathbb{D} = \{z \in \mathbb{C} : |z| \leq 1\}$ be the closed unit disk in $\mathbb{C}$. Let $\mathbb{C}[z]$ denote the set of polynomials $P(z) = a_0 z^n + a_1 z^{n-1} + a_2 z^{n-3} + a_{n-1} z + a_n$, where $a_k \in \mathbb{C}$, $k \in \{0, 1, 2, \ldots, n\}$ and $n \in \mathbb{N}^*$.
We will study sufficient conditions regarding the roots of a polynomial $P \in \mathbb{C}[z]$ which imply the following conjecture, attributed to the bulgarian mathematician Blagovest Sendov.

Conjecture 1. If all the roots of a polynomial $P \in \mathbb{C}[z]$ lie in $\mathbb{D}$ and z^* is an arbitrary root of the polynomial P then the disk $\{z \in \mathbb{C} : |z - z^*| \leq 1\}$ contains at least one root of P'.

We will give sufficient conditions which imply the Sendov's conjecture.