Extension operators that preserve certain geometric and analytic properties

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In this talk we are concerned with certain extension operators which take a univalent function \( f \) on the unit disc \( U \) to a univalent mapping \( F \) from the Euclidean unit ball \( B^n \) in \( \mathbb{C}^n \) into \( \mathbb{C}^n \), with the property that \( f(z_1) = F(z_1, 0) \). This subject began with the Roper-Suffridge extension operator, introduced in 1995, which has the property that if \( f \) is a convex function of \( U \) then \( F \) is a convex mapping of \( B^n \).

We consider certain generalizations of the Roper-Suffridge extension operator. We show that these operators preserve the notion of \( g \)-Loewner chains, where \( g(\zeta) = (1 - \zeta)/(1 + (1 - 2\gamma)\zeta) \), \( |\zeta| < 1 \) and \( \gamma \in (0, 1) \). As a consequence, the considered operators preserve certain geometric and analytic properties, such as \( g \)-parametric representation, starlikeness of order \( \gamma \), spirallikeness of type \( \delta \) and order \( \gamma \), almost starlikeness of order \( \delta \) and type \( \gamma \).

Moreover, we use the method of Loewner chains to generate certain subclasses of normalized biholomorphic mappings on the Euclidean unit ball \( B^n \) in \( \mathbb{C}^n \), which have interesting geometric characterizations.

References


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