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The Roper-Suffridge extension operator and its applications to convex mappings

The talk is twofold. The first is to investigate the Roper-Suffridge extension operator which maps a biholomorhic function f on D to a biholomorphic mapping F on

$$\Omega_{n,p_2,\cdots,p_n}(D) = \left\{ (z_1, z_0) \in D \times \mathbb{C}^{n-1} : \sum_{j=2}^{n} |z_j|^{p_j} < \frac{1}{\lambda_D(z_1)} \right\}, \ \ p_j \geq 1,$$

where $z_0 = (z_2, \ldots, z_n)$ and λ_D is the density of the Poincar$\acute{e}$ metric on a simply connected domain $D \subset \mathbb{C}$. We prove this Roper-Suffridge extension operator preserves ε-starlike mapping: if f is an ε-starlike, then so is F. As a consequence, we solve a problem of Graham and Kohr in a new method. By introducing the scaling method, the second part is to construct some new convex mappings of domain $\Omega_{2,\,m} = \{(z_1, z_2) \in \mathbb{C}^2 : |z_1|^2 + |z_2|^m < 1\}$ with $m \geq 2$, which can be applied to discuss the extremal point of convex mappings on the domain. This scaling idea can be viewed as providing an alternative approach to study convex mappings on $\Omega_{2,\,m}$. Moreover, we propose some problems.