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Editorial

Analytic and Harmonic Univalent Functions

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Studies on analytic univalent functions became the focus of intense research with the Bieberbach conjecture posed in 1916 concerning the size of the moduli of the Taylor coefficients of these functions. In efforts towards its resolution, the conjecture inspired the development of several ingeniously different mathematical techniques with powerful influence. These techniques include Lowner's parametric representation method, the area method, Grunsky inequalities, and methods of variations. Despite the fact that the conjecture was affirmatively settled by de Branges in 1985, complex function theory continued to remain a highly active relevant area of research.

Closely connected are harmonic univalent mappings, which are widely known to have a wealth of applications. They arise in the modelling of many physical problems, such as in the study of fluid dynamics and elasticity problems, in the approximation theory of plates subjected to normal loading, and in the investigations of Stokes flow in the engineering and biological transport phenomena. Harmonic mappings are also important to differential geometers because these maps provide isothermal (or conformal) parameters for minimal surfaces. Indeed various properties of minimal surfaces such as the Gauss curvature are studied more effectively through planar harmonic mappings.

Although a harmonic map provides a natural generalization to studies on analytic univalent functions, surprisingly it fails to capture the interest of function theorists for quite a period of time. The defining moment came with the seminal paper by Clunie and Sheil-Small in 1984. They introduced complex analytic approach in their studies and succeeded in finding viable analogues of the classical growth and distortion theorems, covering theorems, and coefficient estimates in the general setting of planar harmonic mappings. Although there have been substantial steps forward in the studies of harmonic mappings, yet many fundamental questions and conjectures remain unresolved. There is a great expectation that the "*harmonic Koebe function*" will play the extremal role in many of these problems, much akin to the role played by the Koebe function in the classical theory of analytic univalent functions.

This special issue aims to disseminate recent advances in the studies of complex function theory, harmonic univalent functions, and their connections to produce deeper insights and better understanding. These are crystallized in the form of original research articles or expository survey papers.

The response to this special issue was beyond our expectations. Forty papers were received in several areas of research fields in analytic and harmonic univalent functions. All submitted papers went through a rigorous scrutiny of two or three peer-reviewed processes. Based on the reviewers' reports and editors' reviews, thirteen original research articles were selected for inclusion in the special issue.

New concepts and techniques in the theory of first, second, and third order differential subordination and superordination for analytic functions (as well as nonanalytic functions) were introduced. These can be found in the three papers entitled "*Third-order differential subordination and superordination results for meromorphically multivalent functions associated with the Liu-Srivastava operator*" (H. Tang et al.), "*Differential subordinations for nonanalytic functions*" (G. I. Oros and G. Oros), and "*Differential subordination*