Old and New in Complex Dynamics

by

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Abstract

Historically, complex dynamics and geometrical function theory have been intensively developed from the beginning of the twentieth century. They provide the foundations for broad areas of mathematics. In the last fifty years the theory of holomorphic mappings on complex spaces has been studied by many mathematicians with many applications to nonlinear analysis, functional analysis, differential equations, classical and quantum mechanics. The laws of dynamics are usually presented as equations of motion which are written in the abstract form of a dynamical system: $\frac{dx}{dt} + f(x) = 0$, where x is a variable describing the state of the system under study, and f is a vector-function of x. The study of such systems when f is a monotone or an accretive (generally nonlinear) operator on the underlying space has been recently the subject of much research by analysts working on quite a variety of interesting topics, including boundary value problems, integral equations and evolution problems .

There is a long history associated with the problem on iterating holomorphic mappings and their fixed points, the work of G. Julia, J. Wolff and C. Carathéodory being among the most important.

In this talk we give a brief description of the classical statements which combine celebrated Julia's Theorem in 1920 , Carathéodory's contribution in 1929 and Wolff's boundary version of the Schwarz Lemma in 1926 and their modern interpretations.

Also we present some applications of complex dynamical systems to geometry of domains in complex spaces and operator theory.