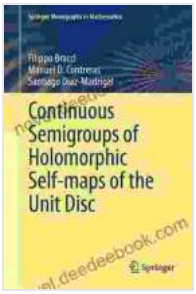
Continuous Semigroups of Holomorphic Self Maps of the Unit Disc

A holomorphic self-map of the unit disc is a function that maps the unit disc onto itself in a holomorphic manner. A continuous semigroup of holomorphic self-maps of the unit disc is a family of such maps that satisfies the following properties:



Continuous Semigroups of Holomorphic Self-maps of the Unit Disc (Springer Monographs in Mathematics)

by Tiffany Lethabo King

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- The identity map is a member of the semigroup.
- The composition of any two maps in the semigroup is also a member of the semigroup.
- For any map in the semigroup, there exists a real number t such that the map is the identity map raised to the power of t.

Continuous semigroups of holomorphic self-maps of the unit disc are important in complex analysis and have applications in various fields, including geometry, physics, and engineering. In this article, we will provide

a comprehensive overview of these semigroups, including their properties, applications, and historical development.

Properties

Continuous semigroups of holomorphic self-maps of the unit disc have a number of important properties. First, they are always compact. This means that they can be written as a closed and bounded subset of the space of all holomorphic self-maps of the unit disc. Second, they are always connected. This means that any two maps in the semigroup can be joined by a continuous path of maps in the semigroup. Third, they are always commutative. This means that the composition of any two maps in the semigroup does not depend on the order in which the maps are composed.

In addition to these general properties, continuous semigroups of holomorphic self-maps of the unit disc also have a number of more specific properties. For example, they are always analytic. This means that they can be represented by a power series that converges in the interior of the unit disc. They are also always conformal. This means that they preserve angles between curves.

Applications

Continuous semigroups of holomorphic self-maps of the unit disc have a wide range of applications in various fields, including geometry, physics, and engineering. In geometry, they are used to study the geometry of the unit disc and to construct conformal mappings between different regions of the disc. In physics, they are used to model the evolution of physical systems and to solve partial differential equations. In engineering, they are used to design and analyze antennas and other electromagnetic devices.

Historical Development

The study of continuous semigroups of holomorphic self-maps of the unit disc began in the early 20th century. The first major breakthrough was made by Henri Poincaré in 1907, who proved that any continuous semigroup of holomorphic self-maps of the unit disc is compact. This result was later generalized by Gaston Julia in 1918, who proved that any continuous semigroup of holomorphic self-maps of the unit disc is analytic. In the 1930s and 1940s, a number of other mathematicians, including Stefan Bergman, Lars Ahlfors, and Lipman Bers, made important contributions to the study of these semigroups.

In recent years, there has been a renewed interest in continuous semigroups of holomorphic self-maps of the unit disc. This interest has been driven in part by the development of new techniques in complex analysis and by the increasing availability of computational power. As a result, there have been a number of new advances in the study of these semigroups, both in terms of their theoretical properties and their applications.

Continuous semigroups of holomorphic self-maps of the unit disc are a fascinating and important class of mathematical objects. They have a wide range of properties and applications, and they continue to be a topic of active research. In this article, we have provided a comprehensive overview of these semigroups, including their properties, applications, and historical development. We hope that this article has given you a better understanding of these important mathematical objects.

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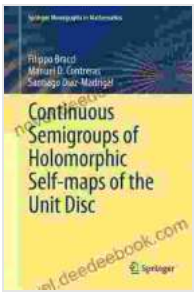

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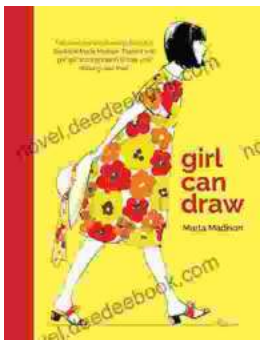

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