

ON ALMOST ABELIAN FINITE TYPE TRANSCENDENTAL SEMIGROUPS

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Abstract: Let S be a finite type semigroup generated by transcendental entire functions. Define escaping set of semigroup S by $I(S) = \{z \in \mathbb{C} : S \text{ is iteratively divergent at } z\}$. In this paper, we investigate the following results: Suppose $I(S) = I(h)$ for generator $h \in S$ such that there exists a conformal map $\phi(z) = -z$ satisfying $h = h \circ \phi$ and $\phi \circ h = g$ with $g \in S$ or there exists a conformal map $\phi(z) = az + b$ for $a, b \in \mathbb{C}$ with $a \neq 0$ satisfying $h \circ g = \phi \circ g \circ h$ for all generators $h, g \in S$. Then the semigroup $S = \langle h, g \rangle$ is almost abelian. Also under the similar condition involving finite generators of S and a conformal map, the subsemigroup generated by some generators among the finite generators is almost abelian. Moreover for every arbitrarily finitely generated semigroup $S = \langle h_1, h_2, \dots, h_n \rangle$ of finite type, neither the semigroup S itself nor any of its subsemigroup(s) is necessarily an almost abelian. However, for every arbitrarily infinitely generated semigroup $S = \langle h_1, h_2, h_3, \dots \rangle$ or finitely generated semigroup $S = \langle h_1, h_2, \dots, h_n \rangle$ of finite type, if $I(S) = I(h_i)$ for $h_i \in S$ satisfying $h_i = h_i \circ \phi$ and $\phi \circ h_i = h_j \in S$ under the conformal map $\phi(z) = -z$ or satisfying $h_i \circ h_j = \phi \circ h_j \circ h_i$ for $h_i, h_j \in S$, where $h_i \neq h_j$ (for $i, j \in \mathbb{N} : i \neq j$) under conformal map $\phi(z) = az + b$ for $a, b \in \mathbb{C}$ with $a \neq 0$, the full semigroup or its subsemigroup(s) or both become necessarily almost abelian.

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