Workshop dedicated to the memory of Professor Gabriela Kohr
Geometric Function Theory in Several Complex Variables and Complex Banach Spaces

Cluj-Napoca, Romania   1 – 3 December 2021

Geometric features of non-linear resolvents in the unit disk

Mark Elin

ORT Braude College, Karmiel , Israel

Abstract

Let f be an infinitesimal generator of a one-parameter semigroup of holomorphic self-mappings on the open unit disk vanishing at zero. Denote by $\mathcal{J} = \{(I + rf)^{-1}, \ r > 0\}$, the family of resolvents of such generators. The aim of this talk is to present properties of such resolvents as univalent functions obtained in [1–3].

We establish, in particular, covering and distortion theorems that enable us to estimate order of starlikeness and order of strong starlikeness for resolvents. It turns out that order of starlikeness grows from $\frac{1}{2}$ to 1. In turn, this implies that the family of normalized resolvents converges to the identity map. Also, any resolvent admits quasiconformal extension to the complex plane $\mathbb{C}$. We prove that any element of $\mathcal{J}$ is also a generator and obtain some characteristics of semigroups generated by them. The existence/non-exoistence of repelling fixed points of resolvents is also studied.

1. M. Elin and F. Jacobzon, Some geometric features of non-linear resolvents, 2021 available in arXiv: https://arxiv.org/pdf/2104.00758.

2. M. Elin and F. Jacobzon, Estimates on some functionals over non-linear resolvents, 2021, available in arXiv: https://arxiv.org.pdf/2105.09582

3. M. Elin, D. Shoikhet and T. Sugawa, Geometric properties of the nonlinear resolvent of holomorphic generators, *J. Math. Anal. Appl.* **483** (2020), No. 123614.