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UNIVERSITÄT BERN

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Mathematisches Institut

Mathematical Colloquia

Monday, 14 November 2022

17:15 h, lecture room B6 (ExWi)

Prof. Dr. Pavel Gumenyuk, University Politecnico di Milano

Squeezing function of a planar domain

The talk is based on a joint paper with Oliver Roth (University of Würzburg, Germany) [Math. Ann. (2022) https://doi.org/10.1007/s00208-021-02296-2]. It is intended for a general audience and, in particular, will contain an example of a physical interpretation helping to solve an abstract mathematical problem. The central topic of the talk is one problem in Complex Analysis motivated by studies in several complex variables, but at the same time making perfect sense and being very challenging in case of complex dimension one as well. For planar domains, the squeezing function problem has a strong flavour of classical extremal problems typical in the theory of conformal mappings. The Riemann Mapping Theorem states that every simply connected domain in the complex plane (different from the whole plane) is conformally equivalent to the unit disk. In case of finitely connected domains, one possible choice of canonical domains, playing the role of the unit disk, is a circularly slit disk, i.e. the unit disk minus a finite number of circular arcs centred at the origin. The squeezing function of a multiply connected domain measures how far from the origin the image of the boundary can be when we "squeeze" the domain into the unit disk with the help of a conformal mapping taking a given point to the origin. Ng, Tang and Tsai [Math. Ann. (2021) https://doi.org/10.1007/s00208-020-02046-w] proved that for any doubly connected domain, the extremal configuration, i.e. the conformal image of the domain with the largest distance of the boundary to the origin, is a circularly slit disk. We give a considerably simpler proof of the same fact and disprove their conjecture that the analogous statement holds for domains of any finite connectivity.