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Conformal mapping of multiply connected slit domains

The first general formula for a Schwarz–Christoffel mapping of a canonical domain of connectivity $m > 2$ onto a conformally equivalent polygonal domain appears in work with DeLillo and Elcrat [DEP,04]. Construction of the mapping and its formula uses infinite sequences of iterated reflections in circles, repeated use of the reflection principle and invariance of the preSchwarzian to obtain an infinite product representation of the derivative of the map and an integral formula for the mapping function. The method can be interpreted as a form of the “method of images” in electrostatics.

The problem of implementing the formula numerically and graphically is pursued in [DDEP,06]. Developing a robust code and a complete, easy to apply procedure remains a challenging problem. In current work with DeLillo, Driscoll and Elcrat, interesting special features have appeared when the target domains are certain canonical slit domains. For example, the direct construction of a formula for the mapping function that produces $f(z)$ explicitly without requiring an integration of the derivative.

Remark The results in [DEP,04] were presented by Elcrat and Pfaltzgraff in 2003 at international meetings ICIAM in Australia and AMS–RSME, Seville, Spain.

References

- [DEP,04] T. DeLillo, A. Elcrat and J. Pfaltzgraff, *Schwarz–Christoffel mapping of multiply connected domains*. J. Anal. Math. **94**(2004), 17–47.
- [DDEP,06] T. DeLillo, T. Driscoll, A. Elcrat and J. Pfaltzgraff, *Computaton of multiply connected Schwarz–Christoffel maps for exterior domains*. Comput. Methods Funct. Theory **6**(2006) 301–315.