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On conformal mapping of multiply-connected domains.

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In the theory of conformal mapping of simply connected domains, we chiefly use the unit circle for canonical domain. On the other hand, in the case of multiply-connected domains, we utilize various types of domains for canonical one. For example, we use the concentric circular ring-domain (circular disc or whole plane) with slits of circular-arcs,(1) the concentric circular ring-domain (circular disc or whole plane) with slits of radial segments, the whole plane with parallel slits, the whole plane with slits of arcs of finite lengths on the logarithmic spirals $\arg z - k \log |z| = C$,(2) and so forth.

Hereafter we consider the domain of finite connectivity, and first, by the potential-theoretic method, we research the problem of conformal mapping of a given n-ply connected domain onto a band-domain parallel to the imaginary axis with slits also parallel to the imaginary axis.

1. Conformal mapping onto a parallel band-domain with parallel slits.

For simplicity we suppose that every boundary-component R_k $(k=1,\cdots,n)$ of a given n-ply connected domain B in the z-plane be Jordan curve.

Performing a finite number of suitable auxiliary mappings of simply connected domains, we can reduce the given domain B to one whose boundary-components are regular analytic curves. Such method has often been used in the mapping-theory of multiply connected domains. Thus we assume that all the curves $R_1, R_2, \ldots, R_n$ are regular analytic. Let z_1, z_2 be arbitrary two points on R_1, and R_1', R_1'' be two boundary-arcs of R_1 separated by them. More