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Schwarz-Christoffel mapping of the annulus.

A new derivation of the Schwarz-Christoffel mapping formula for mapping an annulus onto a conformally equivalent doubly connected polygonal domain is given. The derivation consists of constructing a global singularity function $S(z)$ for the analytic continuation of the preSchwarzian, $f''(z)/f'(z)$, of the mapping function, f . One new and useful feature of the derivation is the construction of $S(z)$ by repeated reflections of singularities that generate the infinite products in the integral formula for $f(z)$ without appealing to elliptic functions. The "theta" functions in the formula are generated in a natural and unavoidable manner. A second novel feature of this work is the proof of the identity $f''(z)/f'(z) = S(z)$ based on the maximum principle for harmonic functions. A derivation of the Schwarz-Christoffel formula for mapping the disk onto a simply connected domain without appealing to Liouville's theorem is an interesting byproduct of this work. (Received October 02, 2000)