Application of Complex Analysis in Solving Two Dimensional Electrostatic Problems

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Abstract

Electrostatic potential problems involving a single translational symmetry axis can be approximated by a two dimensional problem with an infinite uniform extent in the third direction. The method of complex variable potential description combined with conformal transformation is an especially powerful method to solve these equivalent two dimensional problems. In the first half of the talk I will introduce the meaning of analyticity in complex plane, Cauchy-Riemann conditions and develop the concept of conformal mapping with emphasis on connections between such mappings and harmonic functions. Brief discussion on how the Newmann and Dirichlet boundary conditions transform under conformal mapping will be done. The next half will be completely devoted on solving electrostatic potential problems in different two dimensional configurations and also the case of steady flow of electricity in a plane conducting sheet in absence of sources and sinks.

References


