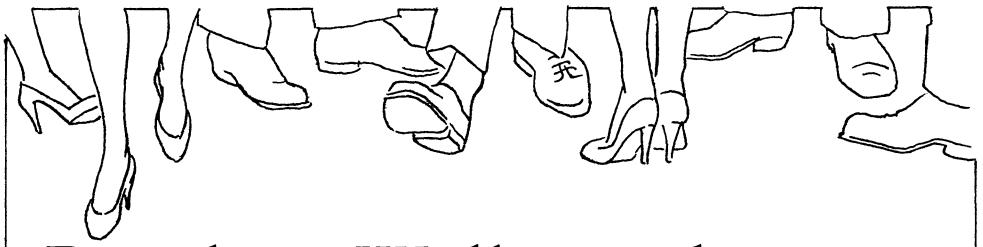

Random Walks and Electric Networks

by J. Laurie Snell and Peter Doyle

xiii + 159 pages. Hardbound
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In this newest addition to the Carus Mathematical Monographs, the authors examine the relationship between elementary electric network theory and random walks, at a level which can be appreciated by the able college student. We are indebted to them for presenting this interplay between probability theory and physics in so readable and concise a fashion.

Central to the book is Polya's beautiful theorem that a random walker on an infinite street network in d-dimensional space is bound to return to the starting point when d = 2, but has a positive probability of escaping to infinity without returning to the starting point when d = 3. The authors interpret this theorem as a statement about electric networks, and then prove the theorem using techniques from classical electrical theory. The techniques referred to go back to Lord Rayleigh who introduced them in connection with an investigation of musical instruments.

In Part I the authors restrict themselves to the study of random walks on finite networks, establishing the connection between the electrical concepts of current and voltage and corresponding descriptive quantities of random walks regarded as finite state Markov chains. Part II deals with the idea of random walks on infinite networks.

Table of Contents

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