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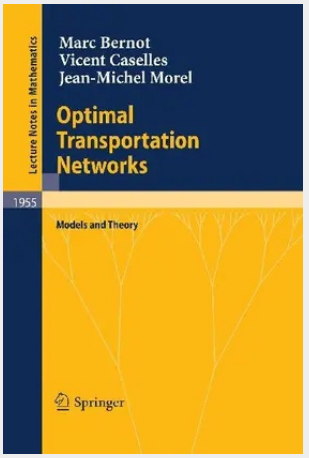
Optimal Transportation Networks

Models and Theory

The transportation problem can be formalized as the problem of ?nding + ? the optimal paths to transport a measure ? onto a measure ? with the same mass. In contrast with the Monge-Kantorovich formalization, recent approaches model the branched structure of such supply networks by an energy functional whose essential feature is to favor wide roads. Given a ?ow ? in a tube or a road or a wire, the transportation cost per unit length ? is supposed to be proportional to ? with 0

Introduction: The Models.- The Mathematical Models.- Traffic Plans.- The Structure of Optimal Traffic Plans.- Operations on Traffic Plans.- Traffic Plans and Distances between Measures.- The Tree Structure of Optimal Traffic Plans and their Approximation.- Interior and Boundary Regularity.- The Equivalence of Various Models.- Irrigability and Dimension.- The Landscape of an Optimal Pattern.- The Gilbert-Steiner Problem.- Dirac to Lebesgue Segment: A Case Study.- Application: Embedded Irrigation Networks.- Open Problems.



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