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Optimal Transport Networks In Nature (Series In Mathematical Biology And Medicine)

Synopsis

This unique book presents a broad range of data on geometry and topology of long-distance liquid transport networks in nature including circulatory and respiratory systems of mammals, trophic fluid transport systems of animals, and conducting systems of higher plants. It is the very first book where evidence of the common design principles and optimal properties of the transportation networks of vascular plants and animals is provided. The book also provides a comprehensive comparative study of the recent measurement results and data analysis, including unique data obtained by the author to conduct systems of plant leaves of different shapes, sizes, venation types and evolutionary ages. It was shown that the mathematical solutions of the optimization problem for the animal and plant conducting systems lead to the same design principles, despite different physical conditions of the fluid transport.

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