

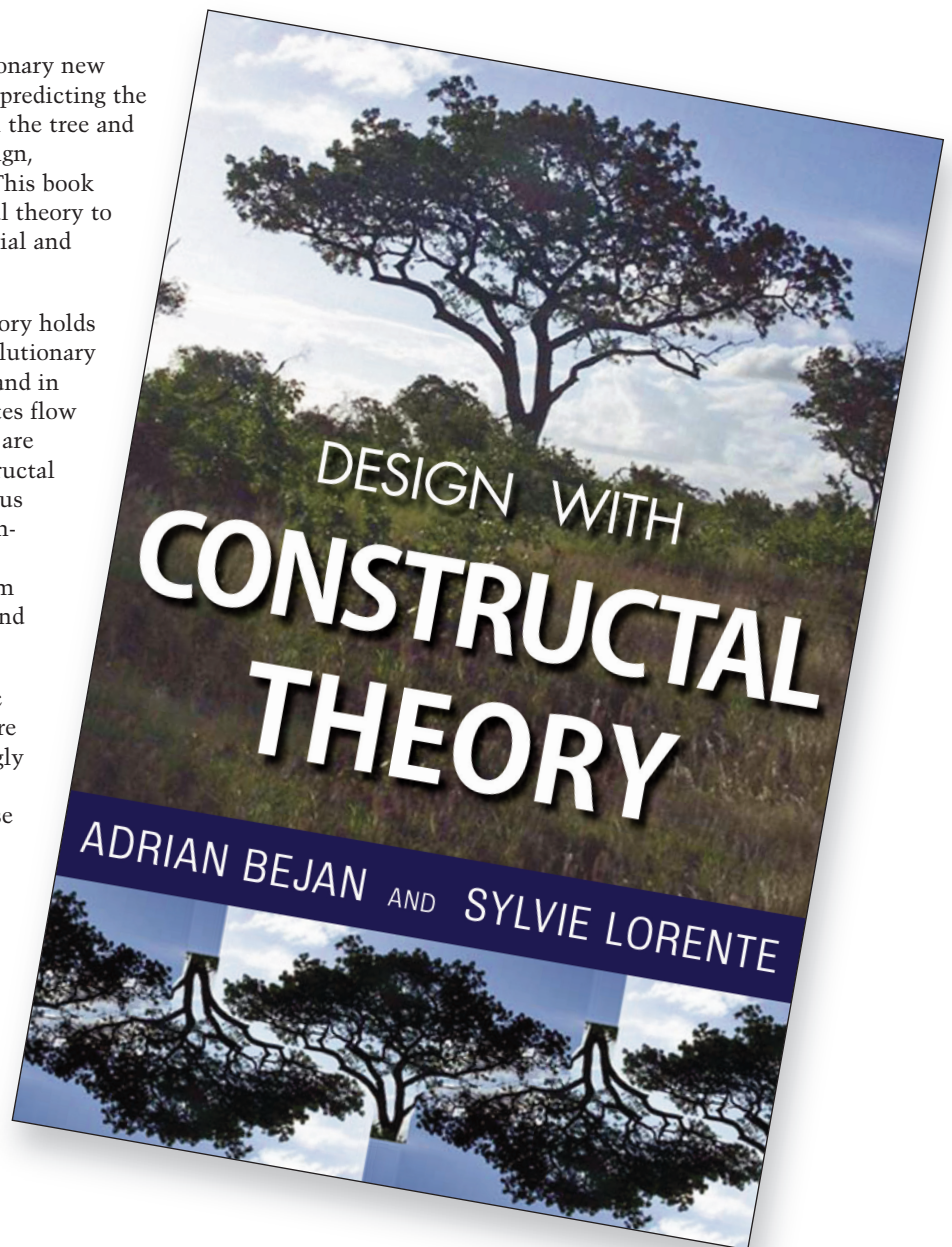
# Design course on the universal principle of configurations in nature and engineering —the constructal law.

*Design with Constructal Theory* offers a revolutionary new approach based on physics for understanding and predicting the designs that arise in nature and engineering, from the tree and the forest to the cooling of electronics, urban design, decontamination, and vascular smart materials. This book shows how you can use the method of constructal theory to design human-made systems in order to reduce trial and error and increase the system performance.

First developed in the late 1990's, constructal theory holds that flow architecture arises from the natural evolutionary tendency to generate greater flow access in time and in flow configurations that are free to morph. It unites flow systems with solid mechanical structures, which are viewed as systems for the flow of stresses. Constructal theory unites nature with engineering, and helps us generate novel designs across the board, from high-density packages to vascular materials with new functionalities (self-healing, self-cooling), and from tree-shaped heat exchangers to svelte fluid-flow and solid structures.

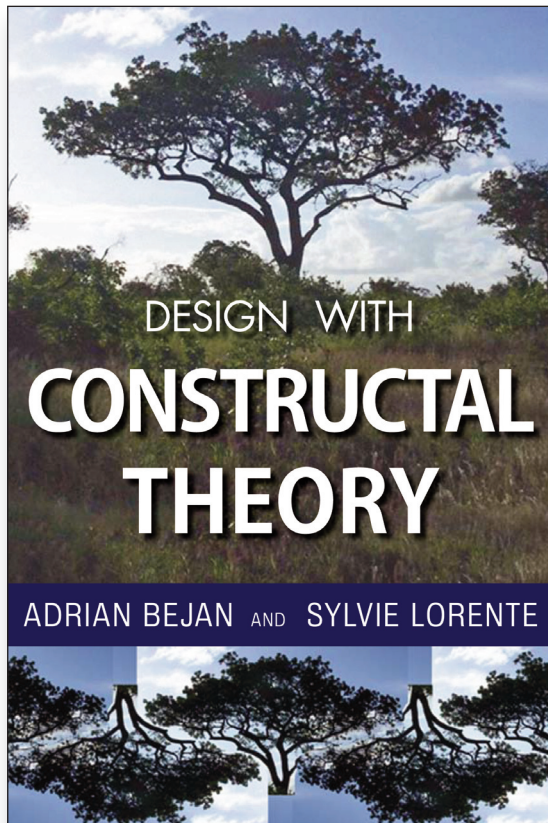
*Design with Constructal Theory* starts with basic principles and then shows how these principles are applied to understanding and designing increasingly complex systems. Problems and exercises at the end of each chapter give you an opportunity to use constructal theory to solve actual design problems.

This book is based on a design course developed by the two authors for upper-level undergraduates and graduate students at Duke University and other universities all over the world. With the authors' expert guidance, students and professionals in mechanical, civil, environmental, chemical, aerospace, and biomedical engineering understand natural systems, and then practice design as science, by relying on constructal strategies to pursue and discover novel and effective designs.



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## Contents:

Preface  
List of symbols  
Chapter 1. Flow Systems  
Chapter 2. Imperfection  
Chapter 3. Simple Flow Configurations  
Chapter 4. Tree Networks for Fluid Flow  
Chapter 5. Configurations for Heat Conduction  
Chapter 6. Multiscale Configurations  
Chapter 7. Multi-Objective Configurations  
Chapter 8. Vascularized Materials  
Chapter 9. Configurations for Electrokinetic Mass Diffusion  
Chapter 10. Mechanical and Flow Structures Combined  
Chapter 11. *Quo vadis* Constructual Theory?  
Nomenclature  
Appendix A. The method of scale analysis  
Appendix B. Lagrange's method of undetermined coefficients (Lagrange multipliers)  
Appendix C. Variational calculus  
Appendix D. Constants  
Appendix E. Conversion factors  
Appendix F. Dimensionless groups  
Appendix G. Nonmetallic solids  
Appendix H. Metallic solids  
Appendix I. Porous materials  
Appendix J. Liquids  
Appendix K. Gases  
References  
Figure captions

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