



# **A Dynamics With Inequalities: Impacts and Hard Constraints (Applied Mathematics)**

*David E. Stewart*

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# A Dynamics With Inequalities: Impacts and Hard Constraints (Applied Mathematics)

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This is the only book that comprehensively addresses dynamics with inequalities. The author develops the theory and application of dynamical systems that incorporate some kind of hard inequality constraint, such as mechanical systems with impact; electrical circuits with diodes (as diodes permit current flow in only one direction); and social and economic systems that involve natural or imposed limits (such as traffic flow, which can never be negative, or inventory, which must be stored within a given facility).

*Dynamics with Inequalities: Impacts and Hard Constraints* demonstrates that hard limits eschewed in most dynamical models are natural models for many dynamic phenomena, and there are ways of creating differential equations with hard constraints that provide accurate models of many physical, biological, and economic systems. The author discusses how finite- and infinite-dimensional problems are treated in a unified way so the theory is applicable to both ordinary differential equations and partial differential equations.

**Audience:** This book is intended for applied mathematicians, engineers, physicists, and economists studying dynamical systems with hard inequality constraints.

**Contents:** Preface; Chapter 1: Some Examples; Chapter 2: Static Problems; Chapter 3: Formalisms; Chapter 4: Variations on the Theme; Chapter 5: Index Zero and Index One; Chapter 6: Index Two: Impact Problems; Chapter 7: Fractional Index Problems; Chapter 8: Numerical Methods; Appendix A: Some Basics of Functional Analysis; Appendix B: Convex and Nonsmooth Analysis; Appendix C: Differential Equations

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