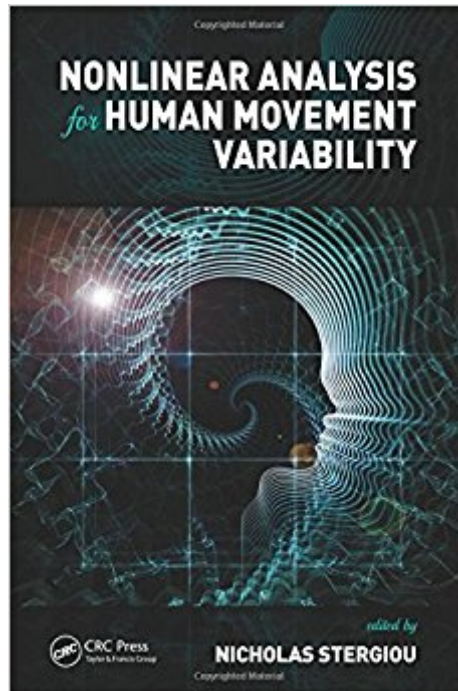




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# Nonlinear Analysis For Human Movement Variability



## Synopsis

How Does the Body's Motor Control System Deal with Repetition? While the presence of nonlinear dynamics can be explained and understood, it is difficult to be measured. A study of human movement variability with a focus on nonlinear dynamics, *Nonlinear Analysis for Human Movement Variability*, examines the characteristics of human movement within this framework, explores human movement in repetition, and explains how and why we analyze human movement data. It takes an in-depth look into the nonlinear dynamics of systems within and around us, investigates the temporal structure of variability, and discusses the properties of chaos and fractals as they relate to human movement. Providing a foundation for the use of nonlinear analysis and the study of movement variability in practice, the book describes the nonlinear dynamical features found in complex biological and physical systems, and introduces key concepts that help determine and identify patterns within the fluctuations of data that are repeated over time. It presents commonly used methods and novel approaches to movement analysis that reveal intriguing properties of the motor control system and introduce new ways of thinking about variability, adaptability, health, and motor learning. In addition, this text: Demonstrates how nonlinear measures can be used in a variety of different tasks and populations Presents a wide variety of nonlinear tools such as the Lyapunov exponent, surrogation, entropy, and fractal analysis Includes examples from research on how nonlinear analysis can be used to understand real-world applications Provides numerous case studies in postural control, gait, motor control, and motor development *Nonlinear Analysis for Human Movement Variability* advances the field of human movement variability research by dissecting human movement and studying the role of movement variability. The book proposes new ways to use nonlinear analysis and investigate the temporal structure of variability, and enables engineers, movement scientists, clinicians, and those in related disciplines to effectively apply nonlinear analysis in practice.

## Book Information

Hardcover: 408 pages

Publisher: CRC Press; 1 edition (January 26, 2016)

Language: English

ISBN-10: 1498703321

ISBN-13: 978-1498703321

Product Dimensions: 6.2 x 1.1 x 9.2 inches

Shipping Weight: 1.6 pounds (View shipping rates and policies)

Average Customer Review: 5.0 out of 5 stars 3 customer reviews

Best Sellers Rank: #499,218 in Books (See Top 100 in Books) #54 in Books > Engineering & Transportation > Engineering > Industrial, Manufacturing & Operational Systems > Ergonomics #83 in Books > Textbooks > Medicine & Health Sciences > Medicine > Biotechnology #171 in Books > Engineering & Transportation > Engineering > Bioengineering > Biomedical Engineering

## Customer Reviews

"This is an excellent book not only for those interested in human movements but for those interested in nonlinear phenomena more generally."-Nonlinear Dynamics, Psychology, and Life Sciences Journal, October, 2016  
"In summary, Nonlinear analysis of human movement variability is a welcome addition for students and researchers of human movement science who are sure to appreciate a new introduction and reference work to this intriguing and important emerging research area"- Journal of Biomechanics, September 2016.

Dr. Nick Stergiou is the Distinguished Community Research Chair in Biomechanics, Professor, and Director of the Biomechanics Research Building at the University of Nebraska Omaha. He is also a Professor in the Department of Environmental, Agricultural, and Occupational Health of the College of Public Health at the University of Nebraska Medical Center. His research focuses on understanding variability inherent in human movement, and he recently founded the first ever Center for Research in Human Movement Variability within the Department of Biomechanics at the University of Nebraska Omaha. Dr. Stergiou is an international authority in the study of nonlinear dynamics and has published more than 200 peer-reviewed articles.

Excellent book

The book includes simple descriptions of the nonlinear measures but also detailed equations and mathematics behind them. There are many examples to make sure the methods are understood.

A comprehensive presentation of all the different approaches used to investigate human movement variability. I really enjoyed the numerous examples included.

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