

1: Introduction to Bifurcation Theory, fall - mathstatKurssit - University of Helsinki Confluence

In the past three decades, bifurcation theory has matured into a well-established and vibrant branch of mathematics. This book gives a unified presentation in an abstract setting of the main theorems in bifurcation theory, as well as more recent and lesser known results. It covers both the local and

Advanced studies About the course Mathematics is playing an ever more important role in physical and biological sciences. Of special interest is the modeling of events that change over time, for example the movement of particles, the spread of a virus or economic growth. Mathematical framework of dynamical systems provides a way to describe and analyze such changes. A perturbation of model parameters, such as an increase in replication ability of a virus, will cause a change in the dynamics. Often such a perturbation results in qualitatively similar behavior. But real fun starts when certain singularity conditions are satisfied and a perturbation can alter the dynamics radically. This is where bifurcation theory is needed. This course focuses on the theory of bifurcations but also on its applications. As the analysis of a model by pure analytical methods is often a formidable task, we will complement the theory with numerical methods. The course will cover the necessary principles of ordinary differential equations and linear algebra, equilibria and their stability, invariant manifolds and their use, and local and global bifurcations. The course is suitable for master students as well as advanced bachelor students. Two hours of exercise classes per week. Exams and getting credits To pass the course and to get credits choose either option 1 or 2: You need half of the points 15p to pass the course. The exam date is one of the public examination dates. Let the lecturer know in advance! Those who chose option 2 and those who chose option 1 and already returned the projects! Grades will be officially registered during the week 6th to 10th of January. Lecture notes are composed from several sources. Main references are Hirsch, Smale and Devaney and Wiggins Did you forget to register?

2: Generic Cell Cycle Model

Introduction to bifurcation theory John David Crawford Institute for Fusion Studies, The University of Texas at Austin, Austin, Texas and Department of Physics and Astronomy, University of Pittsburgh, Pittsburgh, Pennsylvania

There are many, but these are some of my favorites in this really fun area. Dynamics and Bifurcations, Jack K. Hale, Huseyin Kocak This book is intended for undergraduate and beginning graduate students in mathematics or science and engineering. It has many chapters in one, two and three dimensions and was written with lower formalism and is very accessible. Hale is also one of the authors of Methods of Bifurcation Theory Grundlehren der mathematischen Wissenschaften v. Hale, which is a comprehensive book on graduate level bifurcation theory. Nonlinear Dynamics and Chaos: With Applications to Physics, Biology, Chemistry, and Engineering by Steven Henry Strogatz This book is aimed at undergraduates to nonlinear dynamics and chaos and is very readable and accessible. It stresses analytical methods, concrete examples and geometric intuition. There are tons of applications, including such oddities as how fireflies synchronize their blinking, how lasers work, and using chaos to send coded messages. Particularly, there is a bifurcation chapter for one-dimensional flows and a different chapter for two-dimensional flows. An Introduction to Dynamical Systems, D. Place This is an advanced text better suited for graduate students in applied math, physics and engineering. This is from the UK system and the style of writing may not be good for all. A Dynamical Systems Approach: Higher-Dimensional Systems, John H. West This is a four part series of books and they are an excellent and highly recommended. They are written to be accessible although part 2 is closer to a graduate level text. Chapter 9 of Part II is dedicated to Bifurcations. This is one of my favorite set of books. Introduction to Applied Nonlinear Dynamical Systems and Chaos, Stephen Wiggins This book is intended for advanced undergraduates, but is better suited as a graduate level text. It is full of excellent examples and problems. The main focus of this book is bifurcations and the two largest chapters are Local Bifurcations and Aspects of Global Bifurcations and Chaos. This book has served well as a reference book and should be useful for those who are interested in going into this area. Elements of Applied Bifurcation Theory, Yuri Kuznetsov This is a graduate level text and has a pretty moderate mathematical sophistication. What is interesting as well as the several chapters dedicated to bifurcation is the numerical analysis and treatment chapter and the development of said numerical methods and tools. Differential Equations and Dynamical Systems, Lawrence Perko This book is also aimed at advanced undergraduates and graduate level. It is not well received by many due to the problem set, but has an entire chapter Ch 4 dedicated to Nonlinear Systems: You can peruse these on Amazon and see if any suits the style you like. Also, by no means is this intended to be an exhaustive list as there were many other books I could have listed and own, but these are mostly from the excellent TAM series of Springer books and I think it is an excellent series.

3: Bifurcation theory - Wikipedia

Introduction to Bifurcation Theory: Differential Equations, Dynamical Systems and Applications fall Lecturer. PhD Tadeas Priklopil (Speaks English and Finnish; tutoring/discussions/advice may be given in both languages).

4: Introduction to bifurcations of a differential equation - Math Insight

Bifurcation theory is the mathematical study of changes in the qualitative or topological structure of a given family, such as the integral curves of a family of vector fields, and the solutions of a family of differential equations.

5: Introduction to bifurcation-theory

An introduction to bifurcation theory Gr egory Faye¹ ¹NeuroMathComp Laboratory, INRIA, Sophia Antipolis, CNRS, ENS Paris, France October 6, Abstract The aim of this chapter is to introduce tools from bifurcation theory which.

INTRODUCTION TO BIFURCATION THEORY pdf

6: soft question - What is a good text on bifurcation theory? - Mathematics Stack Exchange

In the past three decades, bifurcation theory has matured into a well-established and vibrant branch of mathematics. This book gives a unified presentation in an abstract setting of the main theorems in bifurcation theory, as well as more recent and lesser known results.

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