

MR3892668 49-02 26E70 34N05 39A12

Georgiev, Svetlin G. [Georgiev, Svetlin Georgiev] (F-PARIS4; Paris)

★Variational calculus on time scales.

Mathematics Research Developments.

*Nova Science Publishers, Inc., New York, 2018. x+297 pp. ISBN 978-1-53614-376-8*

From the preface: “This book encompasses recent developments of variational calculus on time scales. It is intended for use in the field of variational calculus and dynamic calculus on time scales. It is also suitable for graduate courses in the above fields. The book contains eight chapters. The chapters in the book are pedagogically organized. This book is specially designed for those who wish to understand variational calculus on time scales without having extensive mathematical background.

“The basic definitions of forward and backward jump operators are due to Hilger. In Chapter 1 are given examples of jump operators on some time scales. The graininess function, which is the distance from a point to the closed point on the right, is introduced in this chapter. They are given the definitions for delta derivative and delta integral and they are deduced some of their properties. They are introduced the exponential function and the trigonometric and hyperbolic functions. In this chapter is given an exposition of the multidimensional dynamic calculus on time scales. They are introduced line integrals on time scales and Green’s formula. The basic results in this chapter can be found in [4] [MR1843232] and [5] [MR3588326]. Chapter 2 introduces dynamic systems on time scales. It is considered the case of constant coefficients. Chapter 3 deals with functionals and self-adjoint second order matrix equations. It is formulated and proved Jacobi’s condition. It is introduced Sturmian theory. Chapter 4 is concerned with linear Hamiltonian dynamic systems. They are deduced some of the basic properties of the symplectic dynamic systems and Hamiltonian dynamic systems. They are introduced Riccati equations and its is proved Picconi’s identity. They are given some criterions for positive definiteness of quadratic functionals. Chapter 5 is devoted on the first and second variation. It is formulated and proved an analogue of Dubois-Reymond lemma on time scales. They are deduced the Euler-Lagrange equation, Legendre’s condition and Jacobi’s condition. Chapter 6 deals with higher-order calculus of variations on some classes of time scales. The double integral calculus of variations is considered in Chapter 7. Chapter 8 deals with Noether’s second theorem without and with transformations of time. It is considered the double delta integral case of Noether’s second theorem.”