

1. Record Nr.	UNINA9910299767303321
Autore	Malinowska Agnieszka B.
Titolo	Advanced Methods in the Fractional Calculus of Variations // by Agnieszka B. Malinowska, Tatiana Odziejewicz, Delfim F.M. Torres
Pubbl/distr/stampa	Cham : , : Springer International Publishing : , : Imprint : Springer, , 2015
ISBN	3-319-14756-0
Edizione	[1st ed. 2015.]
Descrizione fisica	1 online resource (142 p.)
Collana	SpringerBriefs in Applied Sciences and Technology, , 2191-5318
Disciplina	003.3 330 330.0151 510 515.64 519 530.15 629.8
Soggetti	Mathematical optimization Calculus of variations Automatic control Mathematical physics Econometrics Mathematical models System theory Control theory Calculus of Variations and Optimization Control and Systems Theory Mathematical Methods in Physics Quantitative Economics Mathematical Modeling and Industrial Mathematics Systems Theory, Control
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references and index.

Nota di contenuto

1. Introduction -- 2. Fractional Calculus -- 3. Fractional Calculus of Variations -- 4. Standard Methods in Fractional Variational Calculus -- 5. Direct Methods in Fractional Calculus of Variations -- 6. Application to the Sturm-Liouville Problem -- 7. Conclusion -- Appendix - Two Convergence Lemmas -- Index.

Sommario/riassunto

This brief presents a general unifying perspective on the fractional calculus. It brings together results of several recent approaches in generalizing the least action principle and the Euler–Lagrange equations to include fractional derivatives. The dependence of Lagrangians on generalized fractional operators as well as on classical derivatives is considered along with still more general problems in which integer-order integrals are replaced by fractional integrals. General theorems are obtained for several types of variational problems for which recent results developed in the literature can be obtained as special cases. In particular, the authors offer necessary optimality conditions of Euler–Lagrange type for the fundamental and isoperimetric problems, transversality conditions, and Noether symmetry theorems. The existence of solutions is demonstrated under Tonelli type conditions. The results are used to prove the existence of eigenvalues and corresponding orthogonal eigenfunctions of fractional Sturm–Liouville problems. Advanced Methods in the Fractional Calculus of Variations is a self-contained text which will be useful for graduate students wishing to learn about fractional-order systems. The detailed explanations will interest researchers with backgrounds in applied mathematics, control and optimization as well as in certain areas of physics and engineering.
