

# Geometrical Dynamics of Complex Systems: A Unified Modelling Approach to Physics, Control, Biomechanics, Neurodynamics and Psycho-Socio-Economical ... and Automation: Science and Engineering)

Vladimir G. Ivancevic, Tijana T. Ivancevic



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Geometrical Dynamics of Complex Systems is a graduate-level monographic textbook.

Itrepresentsacomprehensiveintroductionintorigorousgeometrical

dynamicsofcomplexsystemsofvariousnatures. By'complexsystems', in this book are meant high-dimensional nonlinear systems, which can be (but not necessarily are) adaptive. This monograph proposes a uni?ed geometrical - proachtodynamicsofcomplexsystemsofvariouskinds:engineering, physical, biophysical, psychophysical, sociophysical, econophysical, etc. As their names suggest, all these multi-input multi-output (MIMO) systems have something in common: the underlying physics. However, instead of dealing with the pop-1 ular 'soft complexity philosophy', we rather propose a rigorous geometrical and topological approach. We believe that our rigorous approach has much greater predictive power than the soft one. We argue that science and te- nology is all about prediction and control. Observation, understanding and explanation are important in education at undergraduate level, but after that it should be all prediction and control. The main objective of this book is to show that high-dimensional nonlinear systems and processes of 'real life' can be modelled and analyzed using rigorous mathematics, which enables their complete predictability and controllability, as if they were linear systems. It is well-known that linear systems, which are completely predictable and controllable by de?nition - live only in Euclidean spaces (of various - mensions). They are as simple as possible, mathematically elegant and fully elaborated from either scienti?c or engineering side. However, in nature, no- ing is linear. In reality, everything has a certain degree of nonlinearity, which means: unpredictability, with subsequent uncontrollability.

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