JGSP **22** (2011) 95–98

JOURNAL OF
Geometry and Symmetry
in Physics

BOOK REVIEW

Topics in Physical Mathematics, by Kishore Marathe, Springer, London • Dordrecht • Heidelberg • New York 2010, xxii+442 pp., ISBN-13 978-1-84882-938-1.

Modern natural science gradually understands that it would be wrong to consider Mathematics as something abstract and away from reality, moreover, step by step we understand that mathematics is a part of our knowledge for physical reality, its various parts and directions of development correspond to the various appearances of the physical reality and to the various humans' levels of knowledge about this sometimes awful, sometimes wonderful, but always challenging world. Two basic concepts of mathematics are "element(s)" and "mapping(s)", and these two concepts express how elements of some kind exist and survive among the elements of other kinds, express, we could say, the harmony of existence and surviving through appropriate changes. It is true that mathematics does not allow an element of a set to be destroyed as physics allows, but it allows families of elements to be built such that we can follow the evolution of the element we have started from to some new element we have come to at the end of the evolution parameter. Interpreting some real process as time parameter we can describe physical processes from the elementary mechanical motion of particles to the complicated internal dynamics of a composite time-stable system and its propagation in space as a whole. In this sense the logical harmony among mathematical concepts represents the harmony of existence among the natural objects, it explains our understanding of the real coexistence, consistency and compatibility of properties.

One of the greatest achievements in this sense is the development of intrinsic consistency and compatibility between algebraic and topological mathematical structures. Clearly, this development is of great importance for physics since algebraic structures allow to identify the subsystems of the time-stable system considered and the topological and differentiable structures allow to follow their time development through physical interaction, i.e. through energy-momentum exchange. Physicists and other natural scientists make discoveries through direct observations, mathematicians help in obtaining appropriate mathematical proficiency, and all this results finally in what we call mathematical physics or physical mathematics, i.e., that part of mathematics, the concepts and theorems of which can serve as logical image of the direct knowledge obtained through observation.