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BOOK REVIEW

Dynamical Symmetry, by Carl Wulfman, World Scientific, Singapore 2011, xx + 437 pages, ISBN-13 978-981-4291-36-1.

The widely used in modern mathematics concepts of *equivalence, invariance* and *symmetry* seem very close to each other, nevertheless, each one carries its special shade of meaning. The most powerful of them seems to be *equivalence*, which is mainly used to establish the same from a definite point of view structure, carried by two sets of mathematical or physical objects. The other two concepts seem to represent the same thing but from additional to each other viewpoints: when under external action an object demonstrates definite stability properties, then *invariance* considers the situation from the viewpoint of the object's surviving strength with respect to the available external action, and *symmetry* gives accent to the nature of the external actions under which the object may change somehow, but keeps its identity. For example, all constant functions $\mathbb{R} \to \mathbb{R}$ are equivalent with respect to differentiation, the euclidean metric g in $\mathbb{R}^3$ is invariant with respect to the orthogonal group O(3). When algebraic structures are under consideration any equivalence is established by *isomorphisms*, and when topological, or smooth, structures are considered then equivalence is established by *homeomorphisms*, or *diffeomorphisms*.

Mathematics has developed powerful methods to get information about some global properties of an object through studying its local/infinitesimal properties, and the basic tool in this respect is the concept of derivative in all of its forms and generalizations. A basic moment here is to find how an object $\mathcal{A}$ changes infinitesimally with respect to other object $\mathcal{B}$, most frequently, but not necessarily, of the same nature. In this respect the central role of the concept of *vector field* defined on some manifold could hardly be disputed. A basic property of every vector field is that it generates flow, i.e., a one-parameter group φ_t of at least local diffeomorphisms of the manifold considered, and this group is parametrized by an external for the manifold parameter t. These groups of diffeomorphisms are finite transformations, and in order to get free of the parameter, mathematics makes use of the so called *Lie derivative*. In its simplest case this operator defines how a vector field X changes infinitesimally with respect to some other vector field Y taking into account the infinitesimal changes of the referent vector field Y too. The most important property