Modeling Platform

By J.A.J. van Leunen

Last modified: 8 April 2018

Abstract

All physical theories that treat dynamic geometrical problems require a modeling platform that combines Hilbert space operator technology with function theory and differential and integral calculus.

1 Base

Eighty years ago, two scholars introduced quantum logic. It is a relational structure that emerges into a separable Hilbert space. Quantum logic is an orthomodular lattice that is quite similar to classical logic [1]. The orthomodular lattice is a set that restricts the kind of relations between elements that it tolerates. The orthomodular lattice does not contain numbers. Thus, notions such as time and space make no sense inside this lattice. This fact changes in the Hilbert space. The Hilbert space is a vector space that applies numbers to specify the inner product of pairs of vectors. These numbers must be members of a division ring. This implies that every non-zero number must own a unique inverse. These numbers deliver the eigenvalues of operators that map the Hilbert space onto itself. This turns the Hilbert space into a repository of data that can be archived in these numbers. The most elaborate division ring is the number system of the quaternions. These number systems exist in many versions that distinguish by the coordinate systems that sequence their members. Thus, on top of a single vector space exist a large series of separable Hilbert spaces that each use a private number system to define their inner product values. In each separable Hilbert space, a reference operator applies this number system as its eigenspace, and this eigenspace acts as a private parameter space. A special category of operators applies the eigenvectors of the reference operator and the target value of a quaternionic function that belongs to the corresponding eigenvalue of the reference operator to define the eigenvalues of the new defined operator. This procedure combines the Hilbert space operator technology with function theory and indirectly with differential and integral calculus.
Quaternions are ideally suited as storage bins for dynamic geometric data that consist of a time stamp and a three-dimensional spatial location.

2 Dynamics

A real number valued progression parameter defines a subspace that is spanned by all vectors that are an eigenvector of a reference operator and share the real part of the corresponding eigenvalue with the progression parameter. This subspace divides the vector space between a historic part, the current static status quo, and a future part. Thus, after sorting the real parts of the eigenvalues, the combination of separable Hilbert spaces form a dynamic model.

3 Embedding

One of the separable Hilbert spaces acts as a background platform. The parameter spaces of the other Hilbert spaces float over the background parameter space. If this background Hilbert space possesses infinite dimensions, then it owns a companion non-separable Hilbert space that embeds its separable partner. The defined operators in this non-separable Hilbert space contain continuums as eigenspaces. Quaternionic functions describe these continuums. Quaternionic differential calculus describes the dynamics of these continuums.
In this base model, a series of separable Hilbert spaces float over the background Hilbert space, and the non-separable companion of the background separable Hilbert space embeds these floating platforms. The symmetries and chirality of the corresponding parameter spaces may cause a dynamic chiral symmetry breaking during the embedding process.

References

The Hilbert Book Model Project [2] explores the mathematical foundation of physical reality. An e-print archive [3] contains documents that highlight certain aspects of this project.

[1] https://golem.ph.utexas.edu/category/2010/12/solers_theorem.html

[2] https://en.wikiversity.org/wiki/Hilbert_Book_Model_Project

[3] http://vixra.org/author/j_a_j_van_leunen