Institut für Geometrie

Vortrag

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Seminarraum 2 des Instituts für Geometrie

Polynomial Loop Appproximation

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Loop groups resp. loop algebras (i.e., groups of periodic functions with values in a Lie group resp. Lie algebra) are studied as simple examples in infinite-dimensional Lie theory. If the group is SU(N), $N \geq 2$, or SO(N), $N \geq 4$, loops are used in communication theory to model transfer functions of power-complementary multi-port channels. In this application situation, polynomial loops represent FIR filters used in feedback compensators. Driven by these applications, an approximation problem arises naturally: How well can an arbitrary loop (measured channel) be approximated (or inverted) by a polynomial loop (FIR filter).

To our great surprise, it turned out that a counterpart of the classical Jackson-Bernstein theory has not been researched in the matrix-group-valued case. On the example of SU(2), we give an introduction to these questions, starting from an application to compensating polarization mode dispersion in high bit-rate fiber communication systems, and explaining the partial theoretical results obtained in joint work with T. Shingel. The main technical ingredients are loop factorizations via matrix exponentials, and the application of splitting methods.

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