Frobenius and Separable Monoidal Algebras and Coalgebras

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The course aims to present the theory of Frobenius and separable algebras from both classical and modern perspective. Frobenius algebras first appeared in Frobenius' work related to algebra representation theory. In addition to this field, Frobenius algebras also appear in number theory, algebraic geometry, combinatorics, code theory, geometry, quantum group theory, Jones polynomial theory etc. Separable algebras form a subclass of Frobenius algebras, and are intensively used in homological algebra and representation theory. Interest in Frobenius and separable algebras is still high due to their connections to monoidal categories and topological quantum field theory.

The content of the course is as follows:

1 Lecture

- The original problem of Frobenius; characterizations for Frobenius algebras.
- Separable algebras; the Eilenberg-Nakayama theorem.
- Symmetric algebras; the Nakayama automorphism.

Lecture 2

- Monoidal categories; adjunctions.
- Frobenius and separable (co)algebras in monoidal categories and 2-categories.
- Symmetric algebras in sovereign categories; the Nakayama automorphism.
- Frobenius algebras in categories of (co)representations.

Lecture 3

- Frobenius and separable functors.
- Frobenius algebras in categories of endofunctors.
- Monoidal Frobenius functors.

Lecture 4

- Frobenius and separable monoidal algebra extensions.
- Adjunctions for monoidal algebra extensions.
- A characterization for some Frobenius monoidal algebra extensions.
- Applications to wreaths and cowreaths.

References

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