

Martingale Theoretic Approach to Noncommutative Stochastic Calculus

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Free – or more generally noncommutative – stochastic analysis is often useful for describing the large N -limit of an ensemble $X^{(N)} = (X_t^{(N)})_{t \geq 0}$ of $N \times N$ matrix stochastic processes. We describe a flexible general theory of noncommutative stochastic calculus that is useful for describing the large- N limits of solutions to $N \times N$ matrix stochastic differential equations. Our theory generalizes the theories of Biane-Speicher for free Brownian motion and Donati-Martin for q -Brownian motion. Moreover, it unifies these theories with some aspects of the classical theory of stochastic calculus. This is joint work with D. Jekel and T. Kemp.

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