

A ROUGH PATH APPROACH TO LARGE MATRIX MODELS

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ABSTRACT. We introduce a rough path approach to proving both, weak and strong convergence of solutions to matrix SDEs and RDEs to their free-probabilistic limits.

This is achieved by developing a version of rough path theory on varying Banach algebras and introducing new notions of weak and strong convergence for non-commutative rough paths. We prove continuity of the associated Itô–Lyons type map: convergence of noncommutative rough paths implies convergence of solutions to the corresponding rough differential equations. We then establish weak and strong convergence of rough paths constructed from GOE(N) and GUE(N) processes.

As part of the work, we for the first time construct canonical rough path lifts of general free semicircular processes in their natural C^* -topology, a long-standing problem in rough path theory.

This is joint work with A. Chandra, I. Chevyrev and M. Peev.