
Rough flows and homogenization in fast-slow dynamics

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Abstract

A general machinery for constructing flows from approximate flows has recently been introduced in the work "Flows driven by rough paths", where it was used to give a simple approach to the core results on rough differential equations. This framework is wider though, and allows to extend the standard theory of stochastic flows beyond the setting of Itô-Stratonovich integration theory. This requires to introduce a setting in which (random) velocity fields are lifted to enriched objects, in the same spirit as rough paths theory. The integration theory of these objects is simple in the above-mentioned setting of approximate flows and shares the same benefits as Lyons' theory : the continuity of the solution map. This continuity result is the key step to get a quick access to interesting homogenization results for fast-slow dynamics, by lifting these systems into the setting of rough flows, and by combining deterministic and probabilistic arguments.

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