The Stationary Behaviour Of Fluid Limits Of Reversible Processes Is Concentrated On Stationary Points.

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Résumé

Assume that a stochastic process can be approximated, when some scale parameter gets large, by a fluid limit (also called mean field limit, or hydrodynamic limit). A common practice, often called the fixed point ap- proximation consists in approximating the stationary behaviour of the sto- chastic process by the stationary points of the fluid limit. It is known that this may be incorrect in general, as the stationary behaviour of the fluid limit may not be described by its stationary points. We show however that, if the stochastic process is reversible, the fixed point approximation is indeed valid. More precisely, we assume that the stochastic process converges to the fluid limit in distribution (hence in probability) at every fixed point in time. This assumption is very weak and holds for a large family of processes, among which many mean field and other interaction models. We show that the reversibility of the stochastic process implies that any limit point of its stationary distribu- tion is concentrated on stationary points of the fluid limit. If the fluid limit has a unique stationary point, it is an approximation of the stationary distribution of the stochastic process.

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