On global stability of optimal rearrangement maps

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Abstract

We study the nonlocal vectorial transport equation $\partial_t y + (\mathbb{P} y \cdot \nabla) y = 0$ on bounded domains of $\mathbb{R}^d$ where $\mathbb{P}$ denotes the Leray projector. This equation was introduced to obtain the unique optimal rearrangement of the initial map $y_0$ as its steady states. We rigorously justify this expectation by proving that for initial maps $y_0$ sufficiently close to maps with strictly convex potential, the solutions $y$ are global in time and converge exponentially fast to the optimal rearrangement of $y_0$ as time tends to infinity. This is joint work with T. Nguyen (Penn. State).