Inverse data matching with the quadratic Wasserstein distance

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Inverse data matching problems aim at finding inputs of mathematical models such that the outputs of the models match given measured data. Numerical solutions of such inverse problems have been mainly based on least-square techniques where one seeks the solutions to the problems as minimizers of an objective function that measures the mismatch between model predictions and measured data. In recent years, the quadratic Wasserstein distance has been proposed as an alternative to the classical L^2 distance for measuring data mismatch in inverse matching problems. Extensive computational evidences showing the advantages of using the Wasserstein distance has been reported. The objective of this talk is to provide some mathematical explanations on the numerically-observed differences between results based on the quadratic Wasserstein distance and those based on the L^2 distance for general linear and nonlinear inverse data matching problems.