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Best Kantorovich and Levy approximations on the real line

Finding best purely atomic approximations of a given probability measure on the real line is an important basic problem that has been studied widely. In this talk, new necessary and sufficient conditions are presented that characterize best approximations relative to the classical Kantorovich (or Wasserstein) and Levy probability metrics, given any number of atoms, and allowing for additional constraints regarding the locations or weights of atoms. Wherever possible, the precise asymptotics (as the number of atoms goes to infinity) of the approximation error is identified for the important special cases of best uniform (i.e., all atoms having equal weight) and best (i.e., unconstrained) approximations, respectively. When compared to similar results known for other probability metrics, the results for Levy approximations, in particular, are more complete and require fewer assumptions.