# Minimax Lower Bound for Kernel Stein Discrepancy Estimation*

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## Abstract

Kernel methods are among the most flexible and powerful approaches of data science and statistics, applicable on a wide variety of domains, and are capable of representing probability distributions without loss of information under mild conditions. The family of kernel Stein discrepancies (KSD) is an instantiation of this toolkit in the context of quantifying goodness-of-fit, with numerous successful applications. To our best knowledge, all available KSD estimators with known rate of convergence achieve a speed $\mathcal{O}(n^{-1/2})$. We present (using two different proof techniques) matching lower bounds both on $\mathbb{R}^d$ and on general domains, providing complementary insights.

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