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# Learning Performance of Regularized Moving Least Square Regression *

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**Abstract:** Moving least square regression is an important local learning algorithm. In this paper we consider a regularized moving least square regression algorithm in reproducing kernel Hilbert space. The localized representer theorem is different from the classical representer theorems for regularized kernel machines. It shows that, regularization not only ensures the computational stability, it is also necessary for the algorithm to preserve localization property. We also studied the learning performance of the regularized moving least square algorithm and conducted a rigorous error analysis. Compared with the unregularized method, convergence analysis of regularized moving least square regression requires more natural and much simpler conditions and achieves fast rates.

**Key words and phrases:** Moving least square regression, regularization, reproducing kernel Hilbert space, error bounds, learning rate.

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## 1 Introduction

As an important local approximation method to deal with scattered data, the moving least square (MLS) approach has attracted much attention in approximation theory and

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