

Fasshauer, Gregory E.

Approximate moving least-squares approximation: A fast and accurate multivariate approximation method. (English) [Zbl 1037.65009](#)

Cohen, Albert (ed.) et al., Curve und surface fitting, Saint-Malo 2002. Fifth international conference on curves and surfaces, Saint-Malo, France, June 27 – July 3, 2002. Brentwood, TN: Nashboro Press (ISBN 0-9728482-1-5/hbk). Modern Methods in Mathematics, 139-148 (2003).

Summary: We propose a fast and accurate approximation method for large sets of multivariate data using radial functions. In the traditional radial basis function approach this task is usually accomplished by solving a large system of linear equations stemming from an interpolation formulation. In the traditional moving least-squares method one needs to solve a small linear system for each evaluation of the approximant.

We present an approximation scheme – based on the work on approximate approximation by *V. Maz'ya* and *G. Schmidt* [J. Approximation Theory 110, 125–145 (2001; [Zbl 0976.41004](#))] – that has approximation properties similar to the moving least-squares method, but completely avoids the solution of linear systems. Moreover, the sums required for the evaluation of the approximant can be processed quickly. We establish a connection to traditional radial basis function approximation by using appropriate radial generating functions. Examples of locally supported as well as globally supported functions with arbitrary approximation orders are given.

For the entire collection see [[Zbl 1023.00023](#)].

MSC:

[65C60](#) Computational problems in statistics (MSC2010)

[62H12](#) Estimation in multivariate analysis

[65F20](#) Numerical solutions to overdetermined systems, pseudoinverses

Cited in **6** Documents

Keywords:

[numerical examples](#); [moving least squares](#); [multivariate approximation method](#); [radial basis function](#); [radial generating functions](#)