Discontinuous Weighted Least-Squares Approximation on Irregular Grids

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Abstract

Discontinuous weighted least - squares approximation (DWLS) is a modification of a standard weighted least-squares approach that nowadays is intensively exploited in computational aerodynamics. A DWLS method is often employed to approximate a solution function over an unstructured computational grid that results in an irregular local support for the approximation. While the properties of a weighted least-squares reconstruction are well known for regular geometries, the approximation over a non-uniform grid is not a well researched area so far. In our paper we demonstrate the difficulties related to the performance of a DWLS method on distorted grids and outline a new approach based on a revised definition of distant points on distorted grids. Our discussion is illustrated by examples of DWLS approximation taken from computational aerodynamics problems.