ENO/WENO RBF techniques

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We present a new approach for the reconstruction of discontinuous one dimensional functions. It consists in applying a parameter-dependent local multiquadric interpolant that incorporates the ENO/WENO (Essentially Non Oscillatory/ Weighted ENO) techniques in the computation of the locally optimized shape parameter. The resulting nonlinear adaptive estimation of the shape parameter leads to accurate reconstructions in the smooth regions and to sharp solution profiles near jump discontinuities avoiding Gibbs phenomena. Differently from what proposed in [1], [2] this is a true radial WENO method that does not revert to classical polynomial WENO approximation near discontinuities. We present also some numerical examples that confirm the theoretical approximation orders.

References

[1] Guo J. and Jung J.-H (2017) A RBF-WENO finite volume method for hyperbolic conservation laws with the monotone polynomial interpolation method, Appl. Numer. Math., 112, pp. 27–50.

[2] Guo J., Jung J.-H. (2017) Radial basis function ENO and WENO finite difference methods based on the optimization of shape parameters, J. Sci. Comput., 70, pp. 551–575.