

Efficient smoothness indicators for a class of WENO methods

A. Baeza ^{*} R. Bürger [†] P. Mulet [‡] D. Zorío [§]

Common smoothness indicators used in Weighted Essentially Non - Oscillatory (WENO) reconstructions [Jiang, G.S., Shu, C.W.: Efficient implementation of Weighted ENO schemes, *J. Comput. Phys.* 126, 202-228 (1996)] have quadratic cost with respect to the order. A set of novel smoothness indicators with linear cost of computation with respect to the order is presented. These smoothness indicators can be used in the context of schemes of the type introduced by Yamaleev and Carpenter [Yamaleev, N.K., Carpenter, M.H.: A systematic methodology to for constructing high-order energy stable WENO schemes. *J. Comput. Phys.* 228(11), 4248-4272 (2009)]. The accuracy properties of the resulting non-linear weights are the same as those arising from using the traditional Jiang-Shu smoothness indicators in Yamaleev-Carpenter-type reconstructions. The increase of the efficiency and ease of implementation are shown.

^{*}Departament de Matemàtiques, Universitat de València , Spain. e-mail: bamanan@uv.es

[†]CI²MA & Departamento de Ingeniería Matemática, Universidad de Concepción, Chile. e-mail: rburger@ing-mat.udec.cl

[‡]Departament de Matemàtiques, Universitat de València , Spain. e-mail: mulet@uv.es

[§]CI²MA, Universidad de Concepción, Chile. e-mail dzorio@ci2ma.udec.cl.