POSTER SESSION OF THE XVIII SPANISH-FRENCH SCHOOL *Jacques-Louis Lions*
ABOUT NUMERICAL SIMULATION IN PHYSICS AND ENGINEERING
Las Palmas de Gran Canaria, June 25-29, 2018

Nonlinear subdivision in Uncertainty Quantification

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Keywords: Truncate and encode, conservation laws, Harten's multiresolution framework, uncertainty quantification, subdivision schemes

Mathematics Subject Classification (2010): 35Lxx, 41-XX, 65-XX

Subdivision schemes are an essential ingredient in multiresolution representations of discrete data sets, and have been used in the past for compression purposes (see e.g. [2]). Linear interpolatory subdivision schemes have been succesfully used in the design of multi-scale techniques that aim at reducing the cost of high-resolution shock capturing schemes for systems of conservation laws, and even in the implementation of Adaptive-Mesh-Refinement (AMR) techniques for such schemes[3].

In recent times, similar multi-scale strategies have been used for the statistics estimation of parameter-dependent solutions of partial differential equations (PDE). In [1, 4], a strategy termed *Truncate and Encode* (TE) was used for uncertainty quantification in the numerical solution of PDEs, and its performance, subject to the use of certain linear and non-linear subdivision processes, was examined. Motivated by a previous study [5], in this work we intend to show that the use of monotonicity preserving non-linear subdivision schemes may be more convenient within the TE strategy than the linear/nonlinear alternatives proposed in [1, 4].

Acknowledgements

The authors acknowledge support from Project MTM2014-54388 (MINECO, Spain) and the FPU14/02216 grant (MECD, Spain).

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