Answer to reviewer #1 on the revised version of the article

Stabilized Times Schemes for High Accurate Finite Differences Solutions of Nonlinear Parabolic Equations

by
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First of all we would like to thank again reviewer #1 for his (her) precise reading and valuable suggestions. All the remarks and modifications proposed have been taken into account in the amended version. We describe below the answers we gave

1. (a) The stability analysis for the linear case given from Proposition 2.1 to theorem 2.5 is indeed standard, it is however important to state these stability results before considering the nonlinear case. We shortened the proofs.

   (b) The first stability result given in the nonlinear case is obtained when treating explicitely the nonlinear term, this leads to an important time-step restriction and is based indeed on a tricky assumption on f. As we privilegied in this paper this kind of schemes, we thought that it is important to derive first this stability result, that can also compare with those obtained by J. Shen [6].

   (c) As sugested by the referee, we adapted RSS-scheme to inconditionally stable schemes for gradient flow. We decide to adapt RSS to those proposed by Elliott/Stuart [2, 3] and Eyre [4] for Phase fields equations. We derived new stability results.

2. We performed the double check proposed by the referee and added it in the text.

3. We added more references on compact-schemes for Navier-Stokes equations, including one swith extrapolations formula for the boundaries [1, 5]. We fixed the typos found by the referee.

References

[1] C. Wang, J.-G. Liu, Analysis of finite difference schemes for unsteady Navier-Stokes equations in vorticity formulation, Numer. Math. (2002) 91: 543-576

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[3] C.M. Elliott and A. Stuart The global dynamics of discrete semilinear parabolic equations. SIAM J. Numer. Anal. 30 (1993) 1622–1663.

[4] D. J. Eyre, Unconditionallly Stable One-step Scheme for Gradient Systems, June 1998, unpublished, http://www.math.utah.edu/eyre/research/methods/stable.ps.

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