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Reply to comment by R. Artebrant on "Finite-volume component-wise TVD schemes for 2D shallow water equations"

Gwo-Fong Lin [a,*], Jihn-Sung Lai [b], Wen-Dar Guo [b]

[a] Department of Civil Engineering, National Taiwan University, Taipei 10617, Taiwan
[b] Hydrotech Research Institute, National Taiwan University, Taipei 10617, Taiwan

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We appreciate the comment. We agree very much with the comment that incorporating a parameter of "α" in the van Leer splitting function to control the signs of the eigenvalues of its Jacobian improves the approximation quality. To show the influence of the "α" on the simulated results, in what follows we simulate an idealized dam-break problem.

The first-order van Leer splitting scheme is used herein. A channel with 1000 m in length and 10 m in width is considered. The dam is located at 500 m downstream of the channel inlet. The initial upstream water depth is 10 m, and the downstream water depth is 0.05 m. The CFL number is set to be 0.8 and 100 computational cells are used. The simulation time is 25 s after the dam breaks. Fig. 1 shows the influence of the "α" on the simulated water depths. In Fig. 1 with the close-up at the dam site, the scheme using the parameter α of 1.0 obviously presents the glitch, whereas that using a parameter of 0.856 does not. It implies that the scheme using a splitting function that satisfies the sign condition improves the glitch, at the expense of introducing some small numerical dissipation (see the close-up at the shock front and the head of the rarefaction wave). The simulated results presented herein may be useful for improving the finite-volume component-wise TVD scheme.

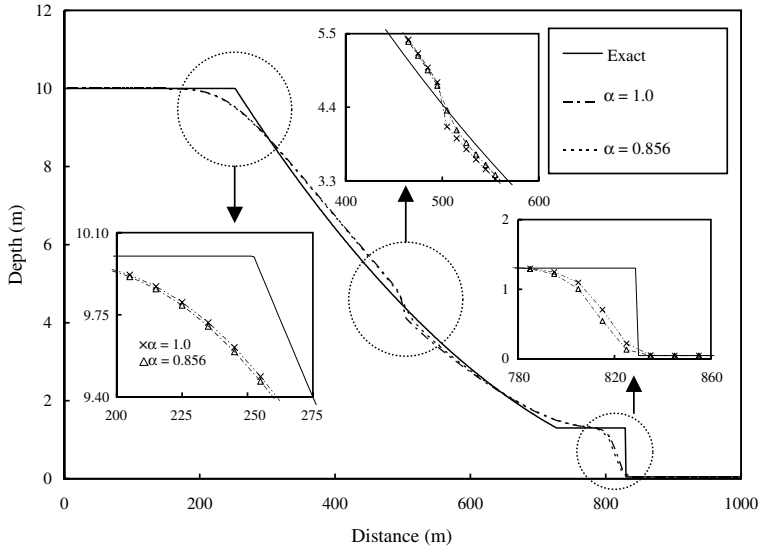

Fig. 1. The influence of the parameter α on the simulated water depths using the first-order van Leer splitting scheme.

* Corresponding author.
E-mail address: gflin@ntu.edu.tw (G.-F. Lin).

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