Dear Editor,

Thank you for your message and for the opportunity to submit our work to Geoscientific Model Development. In the revised version, the major revisions include: (1) adding the Figure captions and listing the figures; (2) using the initials instead of the full names of authors in the section "Author`s contribution"; (3) giving the written-out explanation of scientific abbreviations.

Sincerely,

Qinghe Zhang

REVIEWER COMMENTS

1. Please note, if you used scientific abbreviations without giving the written-out explanation, these must be written out with the next file upload request. However, do not forget that there is a limit to characters (not words!) for “Short summary”: it must be < 500 characters. 2. For the next revision, please use the initials instead of the full names of authors in the section "Author`s contribution".

Figure Captions

Figure 1: Schematic of vertical computational element distribution (example with two layers). Black dots represent the interpolation nodes corresponding to the horizontal one-order and vertical one-order basis functions.

Figure 2: Convergence of the L_2 error of (a) surface elevation, (b) horizontal velocity, (c) vertical velocity, and (d) temperature field in the baroclinic manufactured solution test case.

Figure 3: The density in the lock exchange test under three different grid Reynolds numbers.

Figure 4: Simulating results of (a) relative RPE and (b) the density front location at bottom layer of the lock exchange test with different Re.

Figure 5: The topography of the ideal river plume experiment.

Figure 6: The computational mesh domain and the initial salinity field. The salinity is 0 psu at $x < 0$ km and 32psu at $x \geqslant 0$km.

Figure 7: Simulated surface river plume and surface current velocity at 48 hours. The grid resolution is refined from 1500m (left panel) to 375 m (right panel).

Figure 8: Freshwater content at per salinity class at 48 hours’ results with different grid resolutions.

Figure 9: Surface salinity at the profile of $y = 140$ km under three grid resolutions. Blue and red dashed lines are salinity relative errors with grid size 1500 m and 750 m respectively compared to that of 375 m.

Figure 10: The calculation domain and its grid division of the semi-closed estuary. The minimum grid resolution is 200 m. The river channel cross-section is symmetric about the channel centerline and uniform along the channel direction. The initial water depth is 10.2 m and $\alpha = 0.0007$. Three characteristic points are marked: the channel center (A), the WD boundary (B), and the initially dry location (C). The initial salinity is set to 0 on the left side of the red

solid line and 35 psu on the right side.

Figure 11: A 3D view of a flooding time.

Figure 12: Time series of surface water elevation (a), depth-averaged velocity along the channel (b) and cross the channel (c) at points A, B, and C.

Figure 13: Salinity distribution along the channel centerline cross-section at 1.5 h, 3 h, and 6 h.

Line 11-14:

Numerical method of discontinuous Galerkin (DG) discretization for coastal ocean modelling have advanced significantly, but there are still challenges in accurately simulating phenomena such as wetting and drying process and baroclinic flows in coastal and estuarine regions. This study develops a novel three-dimensional coastal and estuarine modelling system named DGCEMS, using a quadrature-free nodal DG method.

Author contributions

Z.C.: Conceptualization, Methodology, Software, Validation, Writing - Original Draft, Visualization;

Q.Z.: Conceptualization, Writing - Review & Editing, Supervision, Project administration, Funding acquisition;

G.R.: Methodology, Software, Supervision;

Y.N.: Validation, Formal analysis, Visualization.