Dear Prof. Toth,

All your and the reviewer's suggestions make perfect sense and all of them were implemented in the revised manuscript. In particular (line numbers below correspond to the revised manuscript):

1.Modify the first sentence in the Abstract, as suggested by the Reviewer, by changing "dynamical core" to "dynamical equations".

Done: see line 5.

2. *Indicate in the Conclusions that possible future work includes standard dynamical core tests and code optimization. You would want to mention "dynamical core" only in this, last section.*

The following sentence was added to the Conclusion section (line 394):

"Future work should consider standard tests for a dynamical core and possibilities for code optimization."

3. Consider adopting the text related to the length of time steps suggested by the Reviewer.

According to the reviewer suggestion the following text was added to the sentence regarding selection of the time step (line 361):

"(see also the comment on uniqueness of mapping after Eq. (29))."

This text refers to the additional passage concerning uniqueness of the global mapping due a time step (see # 5 below) and it was added according to the reviewer suggestion between lines 229-244.

4. Consider including an acknowledgement regarding the constructive comments we received from the reviewers in the Acknowledgements section.

The following sentences were added in lines 401-403:

"The author appreciates constructive comments made by the reviewers. The author is particularly indebted to one of the reviewers whose insights and thorough examination of details helped to significantly improve this work."

5. Following the reviewer suggestion the following passage which is in fact my response to the reviewer (# 4) at the previous round of reviews was added to the text between lines 229-244:

"The existence and uniqueness (non-degeneracy) of solutions to Eq. (29) may be explained as follows. Let us consider the trajectories of fluid particles. The fluid particle that at $t=0$ was located at the vertex with coordinates $\vec{a}_i$ at a later moment of time t will be located at a point $\vec{r}_i(t)=\vec{a}_i+\vec{\xi}_i$. Points $\vec{r}_i$ form vertices of a shifted tetrahedron onto which the initial tetrahedron is mapped. Note, that shifts $\vec{\xi}$ of the fluid particles inside a tetrahedron are assumed to be linear functions of the shifts of the fluid particles located at the vertices of the tetrahedron: this is our basic (linear) approximation of the forward operator (see the first paragraph of Sec. 3). Thus, the initial tetrahedron with the vertices at the points $\vec{a}_i$ linearly (more precisely, affinely) mapped onto a shifted tetrahedron with vertices at $\vec{r}_i$; the transformation is linear regardless of the trajectories of the fluid particles which started from the vertices $\vec{a}_i$ being linear or curved. In particular, faces and edges of the initial tetrahedron are mapped onto corresponding faces and edges of the shifted tetrahedron. Since shifts of the internal points of the tetrahedron are linear functions of coordinates the Jacobian of the linear transformation of the initial tetrahedron within it is constant (the constants for different tetrahedrons are, of course, also different, and they depend on time t). Thus, piecewise linearity of the forward operator ensures that the mapping of the whole initial volume onto the shifted volume is also piecewise linear, and the mapping is one-to-one provided neither tetrahedron in the course of evolution degenerates (i.e. tetrahedra volumes never become zero).

The latter is achieved by adopting a Courant-limited timestep based on the fastest wave-mode that the equations admit (here, the sound speed), which also ensures that time integration errors remain small. Non-degeneracy of the initial tetrahedrons can be checked easily, since trajectories of the fluid particles at the vertices are calculated in the course of numerical integration."

6. In addition two typos (lines 150 and 357) were fixed.

Respectfully,

Alexander Voronovich