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Geoscientific Model Development Discussions

Interactive comment on "NEMOTAM: tangent and adjoint models for the ocean modelling platform NEMO" *by* A. Vidard et al.

J. Shipton (Referee)

j.shipton@imperial.ac.uk

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This paper describes the development and validation of NEMOTAM, the Tangent linear and Adjoint Model for NEMO. The novelty of the paper lies in the details of the implementation within the NEMO framework rather than in the techniques, tests and applications. As such, the paper fits within the GMD journal remit and I would recommend it for publication with a few minor revisions. In particular, the readability of the manuscript would be improved by checking for language errors, some of which I have indicated below, and by using fewer acronyms. The paper contains a useful discussion of the problems inherent in coding adjoint models and provides justification for the choices made for circumventing these problems within NEMOTAM. However, more information on how to obtain and run the code would be valuable.

Some specific comments:

Pg 6707, line 1: "Automatic tools are now mature enough..." I thought this was a slightly strange way to start the discussion of the relative merits of automatic and hand coded TAM given that you go on to say that automatic tools not yet good enough.

Pg 6711, line 15: "see next section" I don't see where you specifically refer to this later which is a shame as it sounds like an interesting comparison.

Pg 6714, Eqn 3: should the final term be $O((\gamma\delta\mathbf{x}_0)^2)$ or should the text (line 8 on pg 6715) refer to the $O(\gamma^2)$ term?

Pg 6714, line 13: I think it would be clearer to just use the simplified notation straight away, rather than introduce $N(\mathbf{x}_0, \gamma\delta\mathbf{x}_0, t_0, t)$ as I don't think you use the longer version again.

Pg 6714, Lines 16-23: The sentence "The linearisation error is defined by... and the first order accuracy by..." has been interrupted by the remark "From eq 3..."

Pg 6715, Eqn 7: Should the first term on the right hand side be a $\delta\mathbf{x}_0^2$ term not $\delta\mathbf{x}_0^{-2}$?

Pg 6715, line 7: is this really a strict equals sign?

Pg 6721, line 19: do you mean "orthonormal" rather than "orthogonal"? The eigenvectors are orthogonal but can be chosen to be orthonormal.

You give an example of forward and backward singular vectors in figure 3. I understand they're an illustration of the capability of the TAM code rather than to answer any particular question about the flow or the model, but could you give a brief comment on what this example shows, in addition to your general comments on the usefulness of such vectors?

Minor language corrections:

Pg 6706, line 12: missing "with" - should be "directional derivatives *with* respect to"

Pg 6709, line 24: "not" instead of "non"

Pg 6713, line 10: "reserved for" instead of "reserved to"

Pg 6714, line 20: "behaves like" better than "behaves in"

Pg 6715, lines 6-7 : "approximations have to be made" better than "approximations have to be done".

Pg 6715, line 12: "On the other hand" not "On another hand"

Pg 6716, line 18: "uncertainty" instead of "incertitude"

Pg 6716, line 23: another missing "with" (and again on line 1 of pg 6717)

Pg 6725, line 25: "developing" not "developping"

Figure 2 caption: "window lengths" instead of "widows length"

Acronyms:

There are several undefined acronyms in the text (TKE, KPP, TVD, AGRIF, FGAT).

AD is not specifically defined and Autodiff is also used - as each abbreviation is only used once it is possibly simpler to just use "automatic differentiation". Same applies to OBC, VVL, DA, FSV and BSV.

Interactive comment on Geosci. Model Dev. Discuss., 7, 6705, 2014.