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Interactive comment on "On the calculation of normalized viscous-plastic sea ice stresses" *by* Jean-François Lemieux and Frédéric Dupont

Anonymous Referee #1

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The note "On the calculation of normalized viscous-plastic sea ice stresses" by Lemieux and Dupont describes how to compute normalised viscous-plastic sea ice stress properly. They also describe two common traps one can fall into when computing this quantity. This is a valuable (small) contribution that would have saved me from trying to figure out things myself (and wasting a lot of time on that). The text is clearly written, there are a few small comments to consider, see below. The representation is convincing and the explanation of the procedure and the common errors are clear.

I have one small ussue. I would like the authors to revisit the derivation of their equation (6). First, one needs eqs(1,3,4,5) (and not just 1 and 5) and Delta to arrive at an expression like this; second, it only works if P_p in eq(1) is replaced by the replacement pressure P (that's not immediately clear from the text). If one does not want to use

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the replacement pressure P (and there are reasons to do so), the derivation ends up with with P_p instead of P on the rhs, because in eq(1) P_p is on the rhs. This is important because eq(10) with then have a “1” instead of P/P_p and in eq(16) it would be P_p/P instead of “1”. This has implications for the interpretation (but not for the general conclusions, as far as I can see). Adding a treatment of the no-replacement pressure case would be very helpful for the generality of the paper, so I recommend that the paper be published only after addressing this issue.

Minor comments and suggestions:

page 1 l21 large spatial

l24 Unfortunately, . . . I would add how that leads to misunderstandings in order to formulate a “problem statement”. If we all assume we know what we are doing then there’s no problem. E.g., Subtle mistakes in calculating stresses can lead to a complete misinterpretation of the state of convergence. Or similar . . .

page 2 l40: I prefer to write Delta als sqrt((e11+e22)ˆ2 + eˆ{-2}((e11-e22)ˆ2+4e12ˆ2)), because it is also more straightforward to implement . . .

page 3 l63: such as a Picard solver . . . ow with a Newton solver

l65: Kimmritz et al 2015 use the terminology of “modified” EVP. “revised” EVP was used by Bouillon et al 2013.

l76 a Picard solver

page 5 l117: remove: that could be done by modelers

l122: truely?

page 6 l140: remove “that could be made by modelers”

l145 rephrase sentence: This is the equation of an ellipse we obtain if the principal stresses are normalized by the replacement pressure.

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l149, but why only for the elliptical yield curve and not for th Coulombic and Diamond yield curves?

page 7 l166: gives

page 10 Figure 2: I think the caption is misleading. It should start with the statement that sigma is computed based on uˆk only.

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