REVIEW OF 'DISCRETE-ELEMENT BONDED-PARTICLE SEA ICE MODEL'

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1. General comments

I am generally happy with the author's comments to the reviewers' criticisms, and think it is a very nice paper that is worth publishing. I still feel that there are still some important issues with regard to the wave fracture model however.

1.1. **Waves causing ice breakage.**

(1) P8, round L685: *"In the following, an assumption is made that the x-components of torque are produced by the unbalanced buoyancy forces acting on a disk if its upper surface is not parallel to the local sea surface, as shown in Fig.4. It is also assumed for simplicity that exactly half of the disk experiences an excess of buoyancy, the other half an excess of gravity (see also Dumont et al., 2011)."*

In my previous review, I proposed the author calculate the stresses in the bonds by considering the locations and orientations of each disc, assuming that they follow the profiles of the waves. The author responded by saying that that is exactly what is done in the paper. The above quote seems to contradict this statement. If a disc is at a wave peak, for example, how can it experience half gravity and half buoyancy (it would only experience gravity in this case)?

The dispersion relation of the wave already has the buoyancy-gravity balance built into them, and if we assume that the ice doesn't change the wave at all, then we are assuming that the ice doesn't change this balance. Consequently it is my opinion that gravity no longer needs to be considered in the balance of forces, and the stresses in the bonds should just be approximated from the elevation and the slope of the discs relative to each other.

(2) Fig 13: this is still very hard to judge. Its presentation could be improved perhaps with colors for water and different bin sizes of floes, as it is hard to tell whether large areas of white are large floes or large bits of water. Perhaps there could be some indication of the wavelength on the figure too (perhaps the bins for the colorscale could be relative to the wavelength)? Content-wise (also referring to P10, ca L900) can the author confirm that even with very large floes initially it is still impossible to get a simpler pattern like the strips of ice?

(3) Fig 14: perhaps a more useful quantity to consider would be to subtract the rigid body motions of the floes (hitch, pitch etc) from the total motion, and then the remainder would be the "flexural" motion. Then we would probably expect large floes to have more flexural motion (approximately no rigid body motion on average over the whole floe), and smaller ones would have less, since all the discs inside it would be moving more-or-less in phase with each other. However, on the other hand it may not be possible to produce this expected behaviour without a fully coupled 3d model. The other factor in this figure is the damping in the bonds — perhaps the larger floes having more bonds implies the have more damping, so the velocities are lower? Another quantity which might respond in a similar way would be the stresses in the floes — smaller ones would have low stress, and larger ones higher stress (especially if they were about to break).