Reply to Reviewer # 3

December 18, 2010

We would like to thank you, reviewer, for your thoughtful comments and suggestions that helped to improve the quality of our manuscript. We have done a revision to our original work to address all the issues you brought up.

We list below how each of the specific issues were addressed in our revised version. Your questions and comments are included in italics as reference.

1. *Figure 3 concerns a steady test case. The figure plots the computational error against the number of terms in the SVD expansion p. How is the error computed? Is the exact solution known? The figure seems to plot the absolute error; if so, it would be helpful to also give the relative error, or at least the order of magnitude, e.g. is it larger or smaller than 1%? It seems the error is O(h), where h is the grid spacing; is this correct? Can this be demonstrated numerically by plotting results for several values of h?*

   The plot is comparing the treecode to a discrete fluid solve, not to an exact solution to the continuous equations. The relative difference is roughly 5%, depending on h. This error is smaller than the error of our discretizations. We have added an additional subsection (6.3) to provide more data about the treecode's accuracy. In particular, Figure 4 gives a numerical verification that the treecode error is $O(h)$. A paragraph was also added to Section 5.3 to further explain this.

2. *Tables 2 and 5 concern unsteady test cases and show remarkable speedup for the proposed method in comparison with a standard explicit method. However there needs to be some discussion of the accuracy of these results, beyond the fact that the structure remains intact.*

   This is included in our new subsection (6.3).