In this paper, the authors present a new time-stepping approach for the stable and contact-free simulations of dense rigid particle suspensions. In the absence of forces and torques, it is well-known that rigid particles in a Stokesian fluid cannot collide due to lubrication effects. Ensuring this property for discretized problems without significantly reducing the time-step is a challenging task (particularly in dense suspensions). The authors achieve this by extending the method of Lu et al and guarantee a minimum separation by implicitly treating all hydrodynamic interactions implicitly which enables them to take large time steps, even in dense suspensions. The authors demonstrate the effectiveness (both in terms of accuracy and stability) of their approach by many numerical examples and also provide a detailed quantification of the errors introduced by their contact algorithm. As an example, the authors demonstrate the stable simulation of concentrated Taylor-Green flows using a time step of $O(10^{-2})$ where as for the same problem existing approaches encounter difficulties with a time step of $O(10^{-8})$. The ability to take large time steps in dense rigid particle simulations whilst maintaining accuracy and stability is, to the best of my knowledge, a significant improvement over existing methods and thus I strongly recommend publication of this manuscript.

While the paper gives a lot of details regarding various components of their solver, I feel that the paper is lacking in detail when it comes to discussing their main contribution, i.e. how all interactions are handled implicitly. It is particularly confusing since the novelty of the approach is the fully-implicit handling of all hydrodynamic interactions, but the only time discretized equations in the manuscript are the update equations of the rigid body center of masses and orientations which are handled explicitly. It might be more instructive/clearer if the authors presented the complete discretized equations in section 3.3. This would also clarify the discussion of the computational complexity of their approach in the subsequent section. Other smaller comments and suggestions are given below.

- Section 3.2, page 9, line 3, not only do bodies *not* intersect.. (missing "not")

- The same symbol is used for describing self hydrodynamic interactions and the hydrodynamic interactions between different particle in equations 13,14 on Page 10.

- In equation 14, there is an inconsistent subscript as opposed to a superscript for η^{N+1}