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Interactive comment on "Long Range Plasma Momentum Coupling by High Voltage Static Electric field and Deep Space Exploration" *by* Kokwei Chew et al.

Anonymous Referee #1

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The authors proposed a concept of propellantless propulsion scheme, a spacecraft linked to several positively charged lightweight balls by conducting tethers. The scheme has a much smaller structure size than the E-sail and can operate with a very high potential to achieve a large thrust by interacting with exploitable ambient plasma to considerably reducing the travel time of a spacecraft.

This scheme is very well designed. It could be more practical and important if the authors can tell more about the size and the potential material of the lightweight balls and why these balls can decrease the structure size to two orders smaller than the large E-sail. In addition, the authors showed several cases in Table 3. The power consump-

tions are very large (73-103kW) except the first case. The large power consumption may not be suitable for the spacecraft nowadays. I think the author should discuss how the spacecraft power meets the power consumption of their propellantless propulsion, or they can add more cases in Table 3 for the journey to Jupiter, Saturn and Pluto with a power consumption similar to the first case.

other comments and technical corrections:

Line 45-46: 'the distance of the balls is to effectively lower the potential of the structure'. What is the structure, the spacecraft only or the whole scheme? Please explain why 'the distance of the balls' can effectively lower the potential?

Line 115: Which of the two cases is shown in Figure 4? Which direction is the X-axis in Figure 4? Please add labels and units in the figure.

Line 129: Please explain why 'the momentum coupling between the spacecraft and the ambient plasma is stronger than plasma shielding'.

Line 134: the thrust in 2D simulation is 2∼3 times larger than that of 1D simulation. So, it doesn't seem like 'a good approximation'.

Line 140: k ranges from -2+0.3=-1.7 to -2+0.5=-1.5. right?

Line 150: what does the '[11]' mean?

Line 161: What is the thrust-energy efficiency of this scheme proposed by the authors?

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