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Comment on angeo-2022-2

Anonymous Referee #1

Referee comment on "Fine structure and motion of the bow shock and particle energisation mechanisms inferred from Magnetospheric Multiscale (MMS) observations" by Krzysztof Stasiewicz and Zbigniew Kłos, Ann. Geophys. Discuss., https://doi.org/10.5194/angeo-2022-2-RC1, 2022

Dear editor,

I apologize for the delay with my review. I have read the manuscript entitled "Fine structure and motion of the bow shock, and particle energisation mechanisms inferred from MMS observations" by K. Stasiewicz and Z. Klos.

The manuscript addresses the formation of collisionless shocks and particle acceleration and combines data from the MMS satellites with theoretical considerations.

The authors compare the condition for the peak acceleration of particles by perpendicular E and B fields to experimental data and find a good correlation during acceleration bursts. The manuscript condenses techniques and methods from many different previous articles by the first author and others, which makes it a bit difficult at times for non-specialists to follow. However, the authors succeed in communicating well the key findings, among others a novel particle acceleration mechanism they call stochastic resonant acceleration.

The article is well-written. The results are novel and interesting and as far as I can tell correct. I can thus recommend the article for publication in Annales Geophysicae as it is.