

## ***Interactive comment on “On modelling the kinematics and evolutionary properties of pressure pulse driven impulsive solar jets” by Balveer Singh et al.***

**Anonymous Referee #2**

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Referee report manuscript On Modeling kinematic and evolutionary properties of pressure pulse driven impulsive solar jets Balveer Singh, Kushagra Sharma, Abhishek K. Srivastava

This paper presents a numerical modeling of pressure-driven solar jets. More in particular, by using a simplified model of the solar atmosphere with open and expanding field lines, but including the effects of a realistic temperature variation with height, they study the dynamics of pressure-driven pulses mimicking solar jets. The pressure perturbations to the equilibrium atmosphere have a gaussian form and are launched in the chromosphere, mimicking localized heating events. The manuscript provides a series

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of interesting dynamic properties of these jets, which can play an important role in the mass deposition and energy transport to the upper layers of the solar atmosphere. In addition, it is found that these jets exhibit asymmetric parabolic paths. While I find the paper timely, clear, concise and matching the criteria of scientific correctness, I also think that with some small effort it can be improved a lot. I therefore encourage the authors to consider the following suggestions and comments. In addition, I also provide a list of minor corrections.

Major comments: - Fig. 1 shows magnetic field geometry. The evolutionary properties of jets may depend not only on this but also on the strength of the background field, as well as other background physical quantities. I kindly ask the authors to show maps of the background quantities as well, as they can have a direct impact on the results. In this regard, it would be also worthwhile to discuss, and possibly study, the effects of a different background field strengths on the evolution of jets.

- I find odd the adoption of a threshold based on the RGB values of the maps in Fig. 3 to track the jets. Indeed, this is not a physical quantity and color bars in figure 3 are not even shown to help the reader.
- It appears that the data points in Fig. 7 have nothing to do with a linear trend. I therefore recommend not to try to fit any linear function to them.
- Again in fig. 7, there is a big jump between  $Ap=10$  and  $Ap=12$  which I do not physically understand and is not commented in the text.
- Page 9 lines 7-9. The effects of the downward propagating counterpart of the perturbation is mentioned but, there is not supporting plot showing the temporal evolution of the jets and, in particular, this effects.
- It would be nice to show the evolution of the pulses for different quantities (e.g.  $Bz$ ). This would increase the value of the results and provide a more complete characterization of the process.

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Minor comments: - End of Page 4. It is said that the vertical coordinate of magnetic pole is in the convection zone. It would be good to extend the axis range of Fig. 1 to this layer for consistency.

- In order to be consistent with the notation of equations in Sect. 2.1.1, the pressure pulse in Fig. 3 should be indicated as  $Ap=4-22$  not "p"

- The size of the figures is not adequate to the data they contain (i.e. sometimes their are too big)

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Interactive comment on Ann. Geophys. Discuss., <https://doi.org/10.5194/angeo-2019-67>, 2019.

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