

# ***Interactive comment on “Wavevector spectral signature of decay instability in space plasmas” by Horia Comisel et al.***

**Anonymous Referee #1**

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The manuscript is presenting the results of analytical model describing parametric decay to explain earlier published results of 3D numerical simulations by the same authors. The manuscript requires some improvements before being publishable.

Points to be addressed:

\* MAJOR. It is not clearly specified what are the new results in comparison with Viñas and Goldstein (1991) results and other recent studies. The reader should clearly see what has been done until now and what is the new addition to the field. \* MAJOR. Discussion section is missing. Currently the manuscript is not clearly demonstrating that the obtained results are important for something. In the abstract there is a statement "Growth-rate maps serve as a useful tool for predictions of the wavevector spectrum of density or magnetic field fluctuations in various scenarios for the wave-wave cou-

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pling processes developing at different stages in space plasma turbulence." It would be very useful if authors could discuss at least some scenario showing that their quantitative/qualitative results are applicable and important. Also it would be good to discuss the limitations of the method.

\* lines 48-51. The description of  $k_{\perp}$ - and  $w_{\perp}$ - should clearly specify that those describe daughter waves.  $k_0$  is vector but described in text as field-aligned wavevector, this is confusing. \* line 48. What is "state vector", it is never used in the manuscript. \* line 53. It should be more clearly explained what authors mean by "limitation for the frequency domain". \* line 87. The meaning of "domain (1,3) and (0,3)" not explained. \* line 104-105. Needs more clarification how one distinguishes Alfvén and sound daughter modes, as the figure shows only the magnetic field magnitude oscillations. For parallel propagation waves are not compressional so it is surprising to see magnetic field compressions. \* Figure 2: caption does not specify the difference between top left and top right panels. \* Figure 3: It would be good to mark the location of pump waves booth in analytical and simulation results. right panel) are magnetic field and density fluctuations normalised to something, why are magnetic field and density fluctuations the same? It is not the case in other simulations. \* Outlook section should be named "Summary" or "Summary and outlook".

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