Supporting Information for "Kinetic interaction of cold and hot protons with an oblique EMIC wave near the dayside reconnecting magnetopause"

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Figure S1 presents the results of applying the Bellan method (Bellan, 2016) for determination of the **k** vector. The method is based in applying the Ampere's law in the frequency domain $\mu_0\mathbf{J} = i\mathbf{k}\times\mathbf{B}$. Therefore, in order to apply this method on spacecraft wave observations, knowledge of **B** and **J** is required. We use 4 spacecraft averages of the magnetic field and the current is obtained using the curlometer technique. This method assumes that the observed wave is monochromatic and does not vary in the observation time. We take $f = 0.35$ Hz in the spacecraft frame, and the Bellan method yields $\mathbf{k}_{Bellan}$=[0.8, 5.8, 0.9]$\cdot10^{-3}$ km^{-1} in GSE coordinates, corresponding to $\mathbf{k}_{Bellan}$=[1.9, 0.6, 5.6]$\cdot10^{-3}$ km^{-1} in the field aligned coordinate system used in the manuscript.

Table S1 shows the average plasma parameters used to run the wave dispersion solver, whose results are presented in Figures 3a-d of the manuscript. These average plasma parameters correspond to four-spacecraft averaged values in the time interval of Figure 2, 2015-10-24 15:27:25 to 15:27:44 UT.

Table S2 shows the average plasma parameters used for the runs of the wave dispersion solver presented in Figures 3e-h of the manuscript. Heavy ions are not included in this run, for simplicity. Three different number densities are considered for the cold protons.

Table S1. Four spacecraft averaged parameters in the interval 2015-10-24 15:27:25 - 15:27:44 UT, used as input for the wave dispersion solver. The background magnetic field is $B_0 = 37$ nT. The results are plotted in Figures 3a-d of the manuscript.

	e^-	cold H^+	hot H^+	He^+	He^{2+}	O^+
n (cm^{-3})	1.125	0.5	0.5	0.015	0.04	0.07
$T_{\|\|}$ (eV)	330	40	4400	1000	15000	2000
$T_{\perp}/T_{\|\|}$	1.3	1	1.8	1.2	1.8	0.75

Table S2. Input plasma parameters for the wave dispersion solver runs in Figures 3e-h. The background magnetic field is $B_0 = 37$ nT.

	e^-	cold H^+	hot H^+
n (cm^{-3})	0.51/0.6/1.5	0.01/0.1/1	0.5
$T_{\|\|}$ (eV)	330	40	4400
$T_{\perp}/T_{\|\|}$	1.3	1	1.8

References

Bellan, P. M. (2016). Revised single-spacecraft method for determining wave vector k and resolving space-time ambiguity. *Journal of Geophysical Research: Space Physics*, *121*(9), 8589-8599.

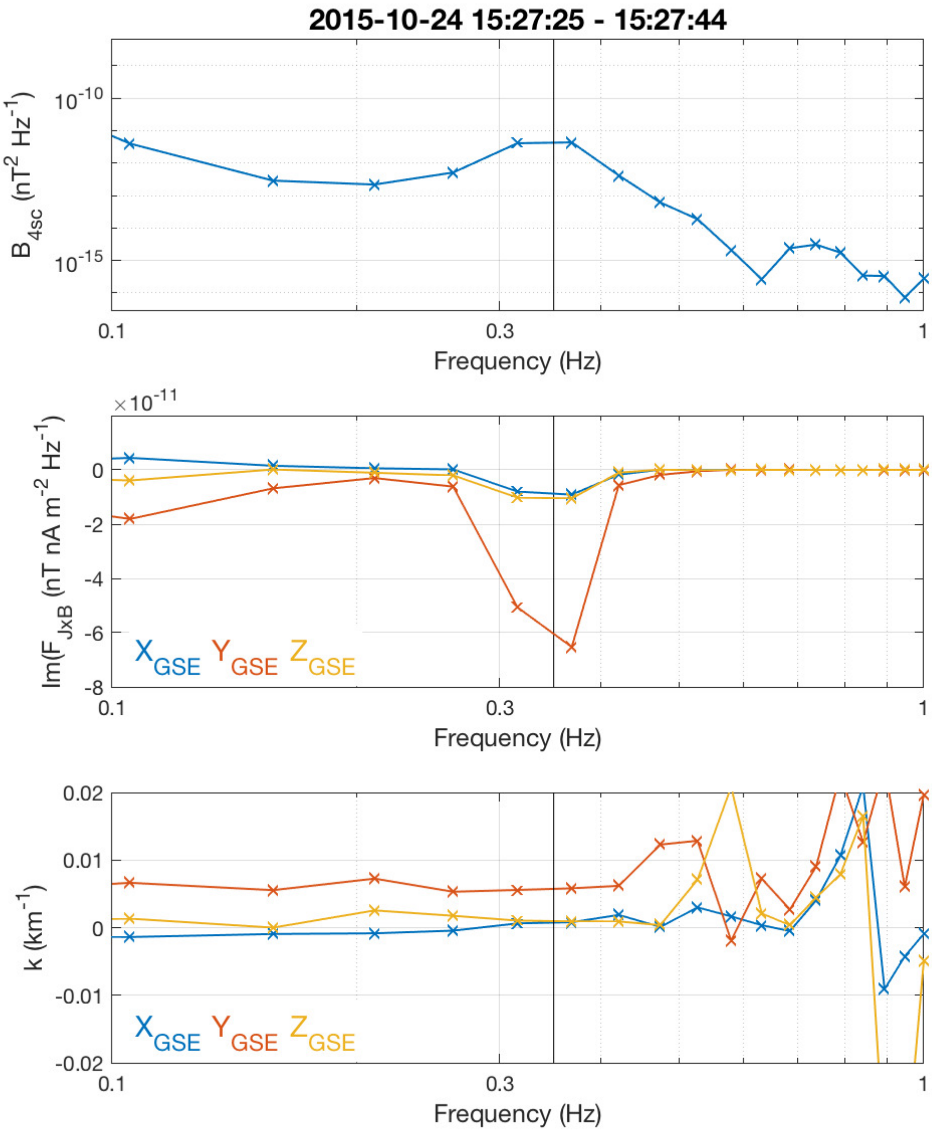

Figure S1. Results of the **k** vector computation using the Bellan method (Bellan, 2016) for the interval 2015-10-24 15:27:25 - 15:27:44 UT. We use four spacecraft averages of the magnetic field, and the current is estimated using the curlometer technique. (Top) Magnetic field power spectrum. Vertical line denotes the center frequency of the **B** field fluctuation. (Center) Imaginary part of the Fourier transform of $\mathbf{J}\times\mathbf{B}$. (Bottom) **k** vector estimation as a function of frequency.