

Supplemental Material to “Low frequency tail of gravitational wave spectra from hydromagnetic turbulence”

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Abstract

In Figs. 3 and 4 of the original version of our paper <https://arxiv.org/abs/2206.00055>, we have shown the time evolution of $|\tilde{T}(k)|$ and $|\dot{\tilde{h}}(k)|$ for five different k values of the wave vector $(k, 0, 0)$. In this Supplemental Material, we provide the time evolution of the same quantities for wave vectors $(0, k, 0)$ and $(0, 0, k)$. The overall behavior of the phases is similar to that for $(k, 0, 0)$.

Time evolution of stress and the derivative of gravitational wave strain at selected wave vectors

As discussed in Section II.B of the paper, the time evolutions of $|\tilde{T}(k)|$ and $|\dot{\tilde{h}}(k)|$ for a particular wave vector can be very different than the collective effect of all the wave vectors of the same length. Furthermore, $\arg(\tilde{T})$ and $\arg(\dot{\tilde{h}})$ remain approximately constant for some time and start evolving more strongly after that. Here, we provide the time evolutions of $|\tilde{T}(k)|$, $|\dot{\tilde{h}}(k)|$, $\arg(\tilde{T})$, and $\arg(\dot{\tilde{h}})$ for two more wave vectors $(0, k, 0)$ and $(0, 0, k)$ in Figures 1 and 2, respectively. Figures 1 and 2 are for the helical case (HEL) and Figures 1 and 2 are the corresponding figures for the nonhelical case (NHEL).

Conclusion

As is evident from these figures, the overall behavior of $\arg(\tilde{T})$ and $\arg(\dot{\tilde{h}})$ is similar as for the wave vector $(k, 0, 0)$ shown in Figure 3 and 4 of the paper for the helical and non helical case, respectively.

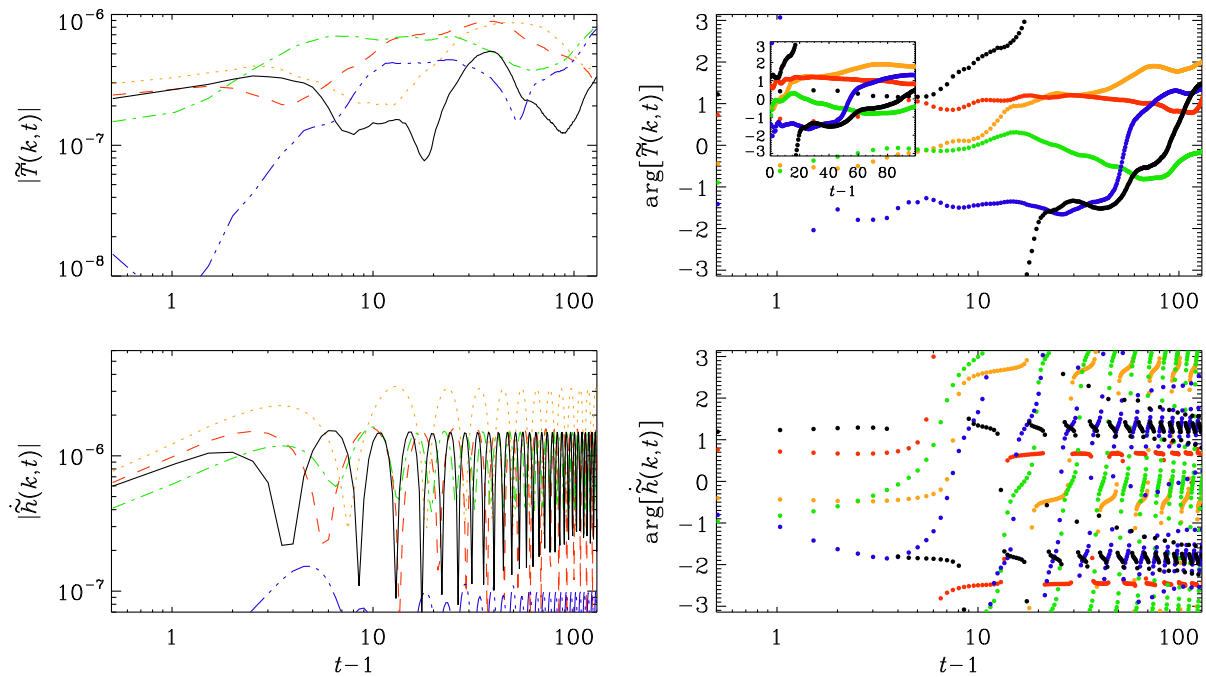


Figure 1: Modulus and phase of $\tilde{T}(k, t)$ and $\dot{\tilde{h}}(k, t)$ for the helical case for $\mathbf{k} = (0, k, 0)$ with $k = 0.3$ (orange), 0.4 (red), 0.5 (green), 0.6 (blue), and 0.7 (black). The inset shows the phase with a linear abscissa.

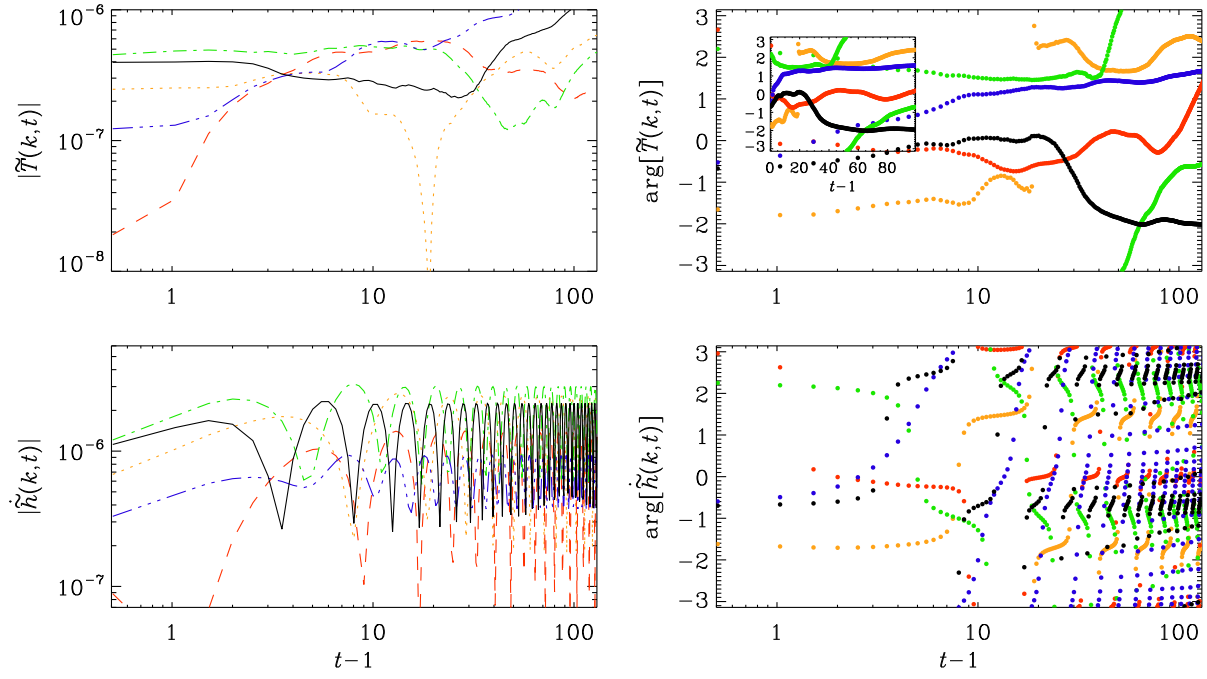


Figure 2: Same as Figure 3, but for the wave vector $\mathbf{k} = (0, 0, k)$.

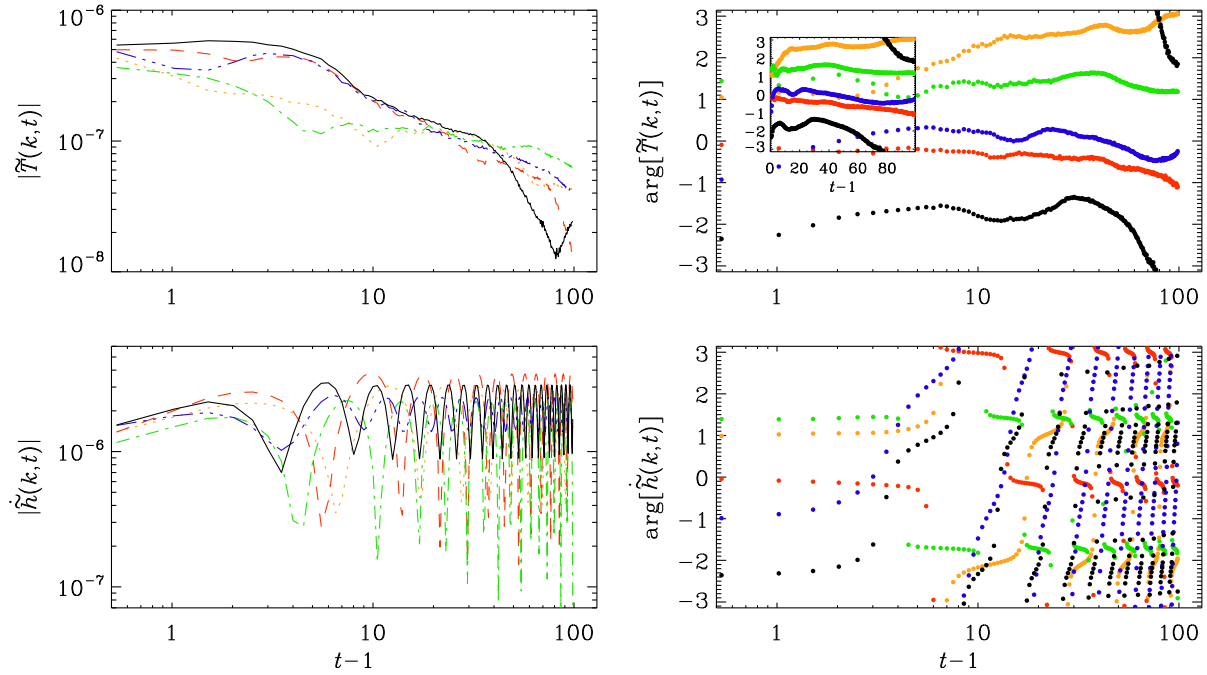


Figure 3: Same as Figure 1, but for the nonhelical case

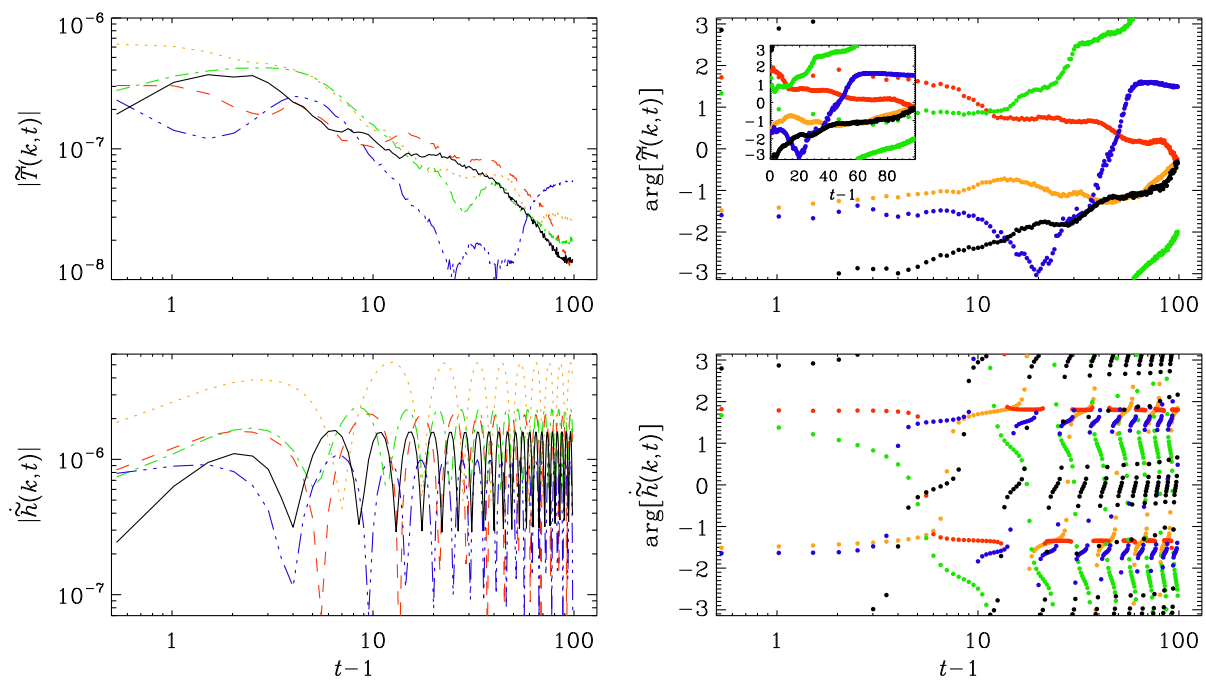


Figure 4: Same as Figure 2, but for the nonhelical case.